

Mothers Coping with Childhood Cancer in the Context of Sociodemographic Disadvantage:
Interactive and Longitudinal Effects on Depressive Symptoms

By

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TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	ii
LIST OF TABLES	iv
LIST OF FIGURES.....	v
Chapter	
I. Introduction.....	1
Stress and Psychological Distress Among Parents of Children with Cancer.....	2
Sociodemographic Disadvantage: Stress and Psychological Distress	4
Operationalizing Sociodemographic Disadvantage: Cumulative Risk Measures.....	7
Effects of Sociodemographic Disadvantage on Parents' Cancer-Related Stress and Distress	9
Parental Coping with a Child's Cancer	12
Coping in the Context of Sociodemographic-Related Stress: Moderation Effects.....	15
Current Study: Rationale and Hypotheses	19
II. Method.....	25
Participants	25
Measures	26
Procedure.....	29
Statistical Analyses	30
III. Results	33
Preliminary Analyses	33
Cross-Sectional Moderation Analyses	34
Longitudinal Moderation Analyses.....	36
IV. Discussion	39
Summary of Findings and Interpretations.....	41
Implications for Intervention and Policy.....	47
Strengths of the Current Study.....	49
Limitations of the Current Study and Future Directions.....	51
Conclusion.....	54
REFERENCES.....	68

LIST OF TABLES

Table	Page
1. Demographic Characteristics of the Sample	56
2. Correlations, Means, and Standard Deviations	57
3. Model 1: Cross-sectional Regression Analyses Predicting Mothers' Depressive Symptoms at Time 1	58
4. Model 2: Cross-Sectional Regression Analyses Predicting Mothers' Depressive Symptoms at Time 2	59
5. Model 3: Longitudinal Regression Analyses Predicting Mothers' Depressive Symptoms at Time 2, Controlling for Time 1 Depressive Symptoms	60
6. Model 4: Longitudinal Regression Analyses Predicting Mothers' Depressive Symptoms at Time 2 from Time 1 Variables	61

LIST OF FIGURES

Figure	Page
1. Proposed Models of Sociodemographic Disadvantage, Cancer-related Stress, and Coping Predicting Mothers' Depressive Symptoms at Each Time Point	62
2. Three-way Interaction of Sociodemographic Disadvantage, Cancer-related Stress, and Coping Predicting Mothers' Depressive Symptoms at Time 1	63
3. Two-way Interaction of Sociodemographic Disadvantage and T2 Coping Predicting T2 Depressive Symptoms	64
4. Two-way Interaction of T2 Cancer-related Stress and T2 Coping Predicting T2 Depressive Symptoms.....	65
5. Two-way Interaction of Sociodemographic Disadvantage and T2 Coping Predicting T2 Depressive Symptoms, Controlling for T1 Depressive Symptoms	66
6. Two-way Interaction of T2 Cancer-related Stress and T2 Coping Predicting T2 Depressive Symptoms, Controlling for T1 Depressive Symptoms	67

CHAPTER I

INTRODUCTION

Each year in the United States over 13,000 families are faced with the enormous stress of a child's cancer diagnosis and treatment (Ward, DeSantis, Robbins, Kohler, & Jemal, 2014). In spite of the increased rate of survival for pediatric cancers (SEER Cancer Statistics Review, 2013), the diagnosis and treatment of cancer remain highly taxing for children and families. Having a child with cancer presents parents with a multitude of significant stressors, ranging from the threat of the child's death, to disruptions in daily routines and functioning, to the financial burden entailed with ongoing, expensive medical treatments (e.g., Bona et al., 2014; Rodriguez et al, 2012). While many parents demonstrate astounding psychological resilience in the face of these stressors, there is a significant body of research documenting increased risk for psychological distress and other problems with psychosocial adjustment among at least a subset of parents (e.g., Pai et al., 2007).

To fully comprehend the psychosocial sequelae surrounding a child's cancer, and to best inform effective psychological interventions and health care policies, it is important to step back and examine the broader socio-ecological context in which the illness might occur (Kazak, 2001). For many families, the experience of a child's illness may unfortunately occur on top of other ongoing or pre-existing burdens. In particular, the experience of extreme economic hardship is a significant source of stress faced by millions of people in the United States, as approximately 15% of families (and 47.6% of female-headed households) are living below the poverty line (U.S. Census Bureau, 2012).

The goal of the present study is to understand and integrate three broad factors that may have a significant impact on psychological well-being among parents of children with cancer: sociodemographic disadvantage, cancer-related stress, and the ways that parents attempt to cope with cancer-related stress with this background in mind. In particular, this study is designed to examine the interaction of these three factors both near the time of diagnosis and one year later, in order to elucidate both contextual and personal risk factors for distress and examine the potential effectiveness of particular coping strategies to manage cancer-related stress within the context of sociodemographic disadvantage. Identifying which parents may benefit most from interventions aimed to reduce the burden of cancer on families, and under what conditions, will assist researchers and clinicians to efficiently target and sensitively tailor screening and assistance programs to families most in need.

Stress and Psychological Distress Among Parents of Children with Cancer

A child's illness is not only stressful for the ill child but also for the entire family (Long & Marsland, 2011). Stress in parents of children with chronic illness has been documented by Cousino and Hazen (2013), whose systematic review of studies parents of children with asthma, cancer, cystic fibrosis, diabetes, epilepsy, juvenile rheumatoid arthritis, and sickle cell disease revealed that across these conditions parents reported greater levels of parenting stress in comparison to parents of healthy children. Changes in income or employment status as a result of accommodating a child's treatment needs, shifts in roles and responsibilities among family members, balancing daily life demands, and costs of treatment have also been cited as stressors among parents of children with cancer (Long & Marsland, 2011). For example, in a study of cancer-related sources of stress for children and parents, Rodriguez et al. (2012) found that

cancer caregiving (a construct that included concerns over the effects of treatment, not being able to help one's child feel better, and not knowing if one's child would get better) was reported as stressful for the largest percentage of mothers and fathers (88% and 74.3%, respectively).

Mothers reported a greater number of daily role functioning stressors (including paying bills and family expenses, concerns about one's job or one's partners' job, and having less time and energy for other family members), communication stressors, and total stressors than fathers.

Further, elevated levels of stress are associated with increased psychological distress in some parents of children with cancer, as several studies have demonstrated heightened symptoms of depression (e.g., Barrera et al., 2004; Bemis et al., 2015; Compas et al., 2015; Iobst et al., 2009; Kazak et al., 2005; Norberg, Lindblad, & Boman, 2005), anxiety (e.g., Dahlquist et al., 1993), and post-traumatic stress symptoms (PTSS) (e.g., Alderfer, Cnaan, Annunziato, & Kazak, 2005; Bemis et al., 2015; Bruce, 2006; Dunn et al., 2012; Rodriguez et al., 2012) among these parents. Mean levels of psychological distress remain significantly higher than normative levels over at least the first several months of a child's treatment (e.g., Maurice-Stam, Oort, Last, & Grootenhuis, 2008; Pai et al., 2007). Mothers in particular report increased challenges with caring 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 after diagnosis (Pai et al., 2007). Notably, Rodriguez et al. (2012) found that total levels of stress, as well as subdomains of stressors associated with caring for a child with cancer including disruptions to daily-role functioning (e.g., missing work), communication (e.g., talking with family members, understanding information about cancer), and illness uncertainty (e.g., not knowing if the child's cancer will get better) were each significantly correlated with increased levels of PTSS among parents.

However, it is critical to note that the studies cited above primarily highlight *subsets* of parents and families who experience significantly poorer psychosocial adjustment when faced with the stress of a child's illness. That is, not all parents will experience psychological distress; in fact, some parents demonstrate remarkable resiliency. Therefore, it is important to understand who among parents of children with cancer may be most at risk for problems with psychosocial adjustment in order to implement effective screening and intervention tactics. The high level of sociodemographic disadvantage faced by many parents of children with cancer is a prime factor to consider in attempting to understand differences in levels of risk.

Sociodemographic Disadvantage: Stress and Psychological Distress

Sociodemographic disadvantage is a multidimensional construct that can be conceptualized as social and demographic factors representing relative lack of both material and social resources. This paper purposefully uses the term sociodemographic disadvantage to reflect that the construct is related to factors representing low-socioeconomic status (SES; typically represented by income, occupation, and/or education; American Psychological Association, 2015), but also encompasses a broader array of social factors, including marital status, that may or may not be directly connected to income or material assets (e.g., Adler & Rehkopf, 2008; Adler & Snibbe, 2003; Brown et al., 2008; Gallo & Matthews, 2003; Matthews & Gallo, 2011) but still reflect potential disadvantage and present a unique constellation of stressors for parents faced with a child's illness (Brown et al., 2008). The present study will focus on three major sociodemographic factors that have been identified as posing risk for psychological maladjustment: income, educational attainment, and single parenthood (Moore et al., 2000).

Individuals from backgrounds characterized by sociodemographic disadvantage are faced with a range of acute and chronic, environmental and psychosocial stressors. Low-income neighborhoods tend to be characterized by decreased access to high-quality housing, shops, affordable food, adequate healthcare services, and transportation (e.g., Evans, 2004; Lovasi, Hutson, Guerra, & Neckerman, 2009), along with excessive exposure to crowding, noise, physical hazards and toxins, and increased actual and perceived threat of crime (e.g., Evans, 2004; Taylor, Repetti, & Seeman, 1997). Together the features of these environments can present numerous, co-occurring, acute and chronic stressors for the families that live within these contexts. Factors related to sociodemographic disadvantage, including lower income and education levels, have been linked to greater likelihood of experiencing negative life events (e.g., Baum, 1999; Dohrenwend, 1973; Kessler, 1979), higher levels of daily and chronic stress (e.g., Gallo, Bogart, Vranceanu, & Matthews, 2005; Hatch & Dohrenwend, 2007; McLeod & Kessler, 1990), and increased parenting stress (e.g., Parkes, Sweeting, & Wight, 2015).

Single parenthood is also associated with increased risk for stress, and although it is generally related to socioeconomic hardship (U.S. Census Bureau, 2012), the stressors endemic to each do not fully overlap. Single mothers have reported more daily hassles related to economic as well as family concerns, personal health problems, and increased parenting stress (e.g., Copeland & Harbaugh, 2005; Johner, 2007; Taylor, Larsen-Rife, Conger, Widaman, & Cutrona, 2010). In addition, single mothers are at heightened risk for depressive symptoms (Cairney, Boyle, Offord, & Racine, 2003). Given that the proportion of single parent families in the United States is rising (U.S. Census Bureau, 2012), a better understanding of the psychological sequelae of single-parenthood will be increasingly important to adequately address mental health care needs of all families.

A national survey of self-reported stress spanning three decades (1983-2009) illustrates consistency in the adverse effects of sociodemographic disadvantage over time in our society (Cohen & Janicki-Devert, 2012). Across all three decades, greater levels of stress were reported by those with lower education and income, unemployed individuals, women, and minorities (differences for race were no longer significant after controlling for income and education), suggesting little has changed since the earliest studies linking sociodemographic disadvantage to adverse psychosocial consequences (Cohen & Janicki-Deverts, 2012). Furthermore, since receiving adequate social support can be a challenge for individuals in communities characterized by sociodemographic disadvantage (Schoon & Parsons, 2002) and access to material and psychological resources to cope with chronic stress are more limited (Matthews & Gallo, 2011), one's potential vulnerability to the adverse impact of stress can be further exacerbated when living under such conditions.

Indeed, the high levels of stress faced by individuals from sociodemographically-disadvantaged backgrounds contribute to a constellation of adverse psychosocial outcomes. Both adults and children living in disadvantaged environments are at increased risk for developing symptoms of depression and posttraumatic stress (e.g., Hatch & Dohrenwend, 2007; Hudson, Puterman, Bibbins-Domingo, Matthews, & Adler, 2013; Koenen, Moffitt, Poulton, Martin, & Caspi, 2007; Lemstra et al., 2008). In reviews of the effects of sociodemographic disadvantage on physical and mental health, Gallo and Matthews (Gallo & Matthews, 2003; Matthews & Gallo, 2011) have also highlighted that high individual and/or community sociodemographic disadvantage relates to higher scores on measures of traumatic stress and depressive symptoms. The vicious combination of increased stressor exposure and diminished psychological resources increases the vulnerability of these individuals to the negative psychosocial effects of stress

(Gallo & Matthews, 2003). Further, the factors that comprise sociodemographic disadvantage may interact with one another to produce even greater risk for negative psychological and physical health outcomes. For example, in one study of the effects of life-course sociodemographic disadvantage (i.e., growing up in a family with low socioeconomic position and retaining low socioeconomic position as an adult) on mental and physical health, participants who experienced life-course sociodemographic disadvantage as well as racial discrimination were significantly more likely to exhibit increased depressive symptoms (Hudson, et al., 2013).

Operationalizing Sociodemographic Disadvantage: Cumulative Risk Measures

Adler et al. (1994) underscored the importance of recognizing that although factors that comprise sociodemographic disadvantage (such income and education) are highly related, they are not fully overlapping, and therefore the impact of sociodemographic factors might “function most powerfully in terms of combinations of variables,” (p. 21). Further, it has been demonstrated that the cumulative load of potential burdens accrued by an individual might have important implications for their physical and psychological sequelae over and above the effects of a singular risk factor (Rutter, 1985), and thus incorporating multiple variables into measures of sociodemographic disadvantage is helpful in understanding of the impact of these factors (Adler et al., 1994; Evans, Li, & Whipple, 2013).

One approach to capturing the myriad of factors related to sociodemographic disadvantage has come from cumulative risk models, which posit that psychological and physical health outcomes are better predicted by taking into account the accumulating number of sociodemographic risk factors instead of the independent consequences of each individual sociodemographic variable (Evans, 2003; Evans, Li, & Whipple, 2013). That is, it appears that

while any individual sociodemographic factor (e.g., family income, education, single parenthood) may exert some influence on an individual or family's risk for stress and psychological distress, the increasing burden of disadvantage across multiple sociodemographic factors can produce an even greater toll on psychological outcomes. These models are heavily influenced by findings from the Isle of Wight Study (Rutter, 1979), which reported that although no single risk factor that was assessed predicted children's psychopathology, the presence of four or more risk factors conferred a tenfold increase in risk.

Typically, cumulative sociodemographic risk is represented by the simple unweighted sum of multiple, dichotomized indicators of sociodemographic disadvantage (each variable is given a score of 0 if absent, 1 is present, with total cumulative risk score reflecting the sum). Two exemplary studies illustrate the concept of cumulative sociodemographic disadvantage and adverse physical and psychological effects in children. First, Doan et al. (2012) employed a cumulative sociodemographic disadvantage variable comprised of nine singular risk factors, including environmental factors (e.g., residential density, noise levels, housing quality), psychosocial factors (e.g., family separation, turmoil, and violence), and demographic variables (e.g., single-parent family, maternal high-school dropout, and income at or below the poverty line). Results indicated that cumulative sociodemographic disadvantage was related to behavior problems as well as decreased self-regulatory abilities in children, while cumulative sociodemographic disadvantage also impinged on mothers' ability to exhibit responsiveness towards their children (though the association of sociodemographic disadvantage with this latter process was weaker).

Second, in a longitudinal study of African American youths living in the rural south, Brody et al. (2013) similarly demonstrated that a cumulative sociodemographic disadvantage

measure (comprised of six sociodemographic variables: current family poverty according to U.S. government criteria, primary caregiver's non-completion of high school or an equivalent, current unemployment of the primary caregiver, single-parent family structure, current family receipt of Temporary Assistance for Needy Families, and family income) at ages 11-13 predicted increased depressive symptoms, externalizing problems, and health problems at age 19.

A review by Evans, Li, and Whipple (2013) consolidates much of the work that has been done to date using cumulative sociodemographic disadvantage measures among children, and evaluates methodological advantages and disadvantages of this additive measure of risk. The authors conclude that although cumulative risk theory is a largely useful way to conceptualize risk, to date gaps still remain in our understanding of how this construct plays out acutely versus chronically, the factors that may moderate its impact, and the contexts in which its effects take hold. In addition, despite clear evidence for the usefulness of cumulative sociodemographic disadvantage models, including demonstrated lasting effects of childhood sociodemographic disadvantage into adulthood (e.g., Brody et al., 2013), few studies to date have focused on adults' sociodemographic disadvantage as a means of elucidating risk for distress among parents facing multiple sources of significant stress.

Effects of Sociodemographic Disadvantage on Parents' Cancer-Related Stress and Distress

Previous studies have emphasized the importance of the socio-ecological context of a pediatric illness (Kazak, 2001), and sociodemographic disadvantage-related factors (including income, education, and marital status) are likely to be an essential part of this milieu. However, despite the clear evidence that sociodemographic disadvantage impinges on psychological

functioning, the potential salience of these factors to families of children with cancer has received relatively little attention in research.

One particularly important factor is single-parent status. Brown et al. (2008) advocated for the need to improve understanding of single parents facing a child's chronic illness, and noted that although there was substantial conceptual support for the hardship that may be experienced by single parents facing a child's illness, the extant literature included no studies in which this issue was the primary focus. Although it has been almost a decade since the publication of this report, few empirical studies have emerged to specifically address this topic or other factors related to sociodemographic disadvantage. Indeed, to date single parenthood appears to be an important predictor of outcomes among parents of children with cancer and other illnesses, but the precise nature of this effect remains unclear. Mullins et al. (2011) focused on the effects of single motherhood on parents' perceptions of vulnerability of the child, parental overprotection, and parenting stress in a sample of mothers of children with cancer, sickle cell disease, type 1 diabetes, asthma, cystic fibrosis, or hemophilia. Interestingly, the authors found that single mothers evidenced higher levels of perceived vulnerability and parenting stress (but not overprotection) than married parents, but these differences were no longer significant when controlling for family income. This finding is in contrast to a recent study in which single parenthood was a significant predictor of parental psychological functioning over and above the influence of income (e.g., Bemis et al., 2015), but both results provide support for the benefits of measuring sociodemographic factors as both independent and interrelated concepts.

In a review of studies examining the effects of several sociodemographic factors (including income, education, single parenthood, race/ethnicity, employment, and composite measures) on parents' and children's adjustment to childhood chronic illness, support was found

for the overall psychosocial impact of sociodemographic factors at both the individual and collective levels (Bemis, 2015). Despite the relatively few studies that have focused on sociodemographic disadvantage as a potential source of stress among families facing chronic illness, these factors consistently emerged as significant covariates to psychosocial outcomes when included as part of multivariate models, suggesting that they warrant further attention in their own right. In particular, Bemis (2015) noted that composite measures of sociodemographic disadvantage appeared to be the most salient sociodemographic indicators of risk for maladjustment among parents of children with chronic illness. Although only six studies included in this review used composite or cumulative measures to test associations between sociodemographic disadvantage and parents' adjustment, all six of these detected a significant association, suggesting that this type of approach especially warrants further use in subsequent research on sociodemographic disadvantage-related effects.

One recent study (Bemis et al., 2015) examined cumulative effects of sociodemographic constructs (marital status, family income, parental education, and race) on stress and psychological distress among children with cancer and their mothers. Building on the guidelines for measurement of sociodemographic effects in the broader health psychology literature reviewed above (e.g., Brody et al., 2013; Doan et al., 2012; Evans, 2003), this study utilized a cumulative risk-based sociodemographic disadvantage measure in order to assess the collective impact of sociodemographic variables. Each separate factor within the composite demonstrated significant individual effects, with the exception of race (however, it was noted that this may have been due to limited sample variability). Further, the cumulative sociodemographic disadvantage measure was a robust predictor of both mothers' and children's stress and distress at the time of a child's cancer diagnosis.

Despite initial evidence of sociodemographic disadvantage-related effects on psychosocial adaptation in parents of children with cancer, this concept has been largely overlooked in the pediatric literature to date and much more research is needed on this topic. Increased rigor and complexity in our conceptualization of this phenomenon is essential. In particular, an understanding of possible moderating mechanisms under which sociodemographic disadvantage might impact adjustment to a child's cancer can assist in developing effective prevention and intervention strategies for parents facing this tremendous burden. One potential mechanism is the way that parents cope with the stress of a child's cancer.

Parental Coping with a Child's Cancer

When considering how the stressors faced by sociodemographically disadvantaged parents of children with cancer may impact parents' overall distress, it is also important to understand the ways in which parents cope with these sources of stress. Identifying patterns of coping that may be associated with higher or lower levels of symptoms of distress can help to elucidate the underlying mechanisms for potential increased risk among some parents.

A better understanding of the role of coping among parents facing the stress of a child's cancer is also crucial for the development of effective psychological interventions.

Several studies have examined the relationships between coping and parental distress among parents of children with cancer (e.g., Barrera et al., 2004; Compas et al., 2015; Fuemmeler, Mullins, Van Pelt, Carpentier, & Parkhurst, 2005; Greening & Stoppelbein, 2007; Maurice-Stam et al., 2008; Murphy, Flowers, McNamara, & Young-Saleme, 2008; Norberg et al., 2005; Sloper, 2000). However these studies represent substantial heterogeneity in measures of coping, types of coping strategies assessed, time since the child's diagnosis, and sample

characteristics. For example, in a review by Clarke et al. (2009) the authors noted that among eight studies of parents coping with a child's cancer, all used different measures and examined different subtypes of coping. Moreover, only a portion of these studies has used validated measures of coping, such as the COPE (Carver, 1997), the Responses to Stress Questionnaire (Connor-Smith et al., 2000; Miller et al., 2009; Rodriguez et al., 2012), the Utrecht Coping List (Schreurs et al., 1993), and the Ways of Coping Checklist (Folkman & Lazarus, 1980).

There is an increasingly large body of research supporting a control-based model of coping with stress, including the ways that parents cope with the stress of a child's chronic illness such as cancer (Compas, Jaser, Dunn, & Rodriguez, 2012; Compas, Jaser, Dunbar, Watson, Bettis, Gruhn, & Williams, 2014). This model draws on Weisz and colleagues' model of perceived control (e.g., Rudolph et al., 1995; Weisz et al. 1994) and posits that the level of actual and perceived controllability of illness-related stressors is important for understanding the ways that parents cope with a child's illness. Three categories of coping are distinguished: primary control coping, secondary control coping, and disengagement coping (Compas et al., 2012). Primary control coping encompasses strategies intended to directly amend the source of stress (e.g., problem solving) or one's emotional reactions to the stressor (e.g., emotional expression, emotional modulation). Secondary control coping involves efforts to adapt to the source of stress (e.g., cognitive reappraisal, positive thinking, acceptance, distraction). Finally, disengagement coping includes efforts to orient oneself away from the source of stress or one's reactions to it (e.g., avoidance, denial, wishful thinking). This model of coping, as measured by the Responses to Stress Questionnaire (Connor-Smith et al., 2000) has been validated through confirmatory factor analyses in diverse samples of children and adolescents (e.g., Benson et al., 2011; Calvete & Connor-Smith, 2006; Compas et al., 2006), and adult samples of women coping with breast

cancer (Compas et al., 2006) and parents coping with economic stress (Wadsworth, Raviv, Compas, & Connor-Smith, 2005). In previous studies, secondary control coping has been found to be most adaptive for coping with uncontrollable stress, whereas primary control is better suited for controllable stressors (Compas et al., 2012, 2014).

This control-based model of coping may be particularly effective in clarifying coping processes in parents of children with cancer because these parents face a myriad of stressors that vary considerably in their degree of controllability. That is, elements of cancer treatment that parents have rated as stressful (Long & Marsland, 2011; Rodriguez et al., 2012) may include some aspects that are relatively controllable (e.g., talking to doctors to gather information, adhering to treatment, managing changing routines, talking with the child about cancer) whereas others are relatively uncontrollable (e.g., not knowing if the child will get better, effects of treatment, not being able to help the child feel better, costs of treatment). This model of coping was recently examined in a sample of mothers and fathers of pediatric cancer patients close to diagnosis (Compas et al., 2015). In this study, analyses revealed that while mean levels of distress were higher overall for mothers than for fathers, individual coping responses were related to distress among both mothers and fathers. Specifically, both primary and secondary control coping strategies were associated with lower levels of parents' depressive symptoms, whereas disengagement coping was related to increased symptom levels in both bivariate correlation and multiple regression analyses (Compas et al., 2015). This study provides a useful framework for understanding relationships between coping and distress among parents of children with cancer. However, to date no studies have examined how coping may interact with other known risk factors for distress, such as sociodemographic disadvantage and cancer-related stress, to either exacerbate or mitigate risk for negative psychological outcomes.

One study of mothers of children with diabetes provides some direction for the examination of the relationships between coping, sociodemographic disadvantage, and distress in pediatric populations. Jaser, Linksy, and Gray (2014) found demographic differences in coping strategies utilized by mothers of children with type 1 diabetes, such that mothers of color and single mothers were more likely to use disengagement coping (no demographic differences were detected for primary and secondary control coping). In this study, coping was also related to mothers' depressive symptoms, suggesting a possible link between sociodemographic factors, coping, and depressive symptoms; however this was not directly assessed.

The current study and hypotheses build upon previous analyses of parental coping with pediatric cancer and other childhood illnesses by examining how mothers' coping may interact with their levels of cancer-related stress and sociodemographic disadvantage to impact depressive symptoms at the time of a child's cancer diagnosis as well as one year post-diagnosis.

Coping in the Context of Sociodemographic-Related Stress: Moderation Effects

Research on poverty-related stress has recently begun to incorporate examinations of coping as a possible source of resilience to the psychological impact of sociodemographic disadvantage. For example, a review by Evans and Kim (2013) highlights evidence that primary and secondary control coping can mitigate long-term effects of chronic stress among children living in poverty. The authors first discuss the ways in which the ecological context of childhood poverty, including the experience of disrupted parenting and family relationships (e.g. Conger & Donnellan, 2007; Grant et al., 2003), increases risk for chronic and accumulated psychological and physiological stress (e.g., Evans & English, 2002). Evans and Kim (2013) further emphasize that these environmental stressors interfere with self-regulatory processes, such that low-income

adolescents are more likely to use maladaptive, disengagement coping strategies which are associated with increased internalizing and externalizing symptoms in this population (Wolff, Wadsworth, & Santiago, 2010). Conversely, although the literature on the topic is relatively limited thus far, it has been demonstrated that low-income children adolescents who engage in primary and secondary control coping strategies including problem solving, cognitive reappraisal, and optimism/positive thinking exhibit fewer negative psychophysiological effects (e.g., Wolff et al., 2010; Chen & Miller, 2012).

These findings dovetail with the large body of research demonstrating negative physical and psychological outcomes among adults who grew up in low-income environments (e.g., Matthews & Gallo, 2011; Miller, Chen, & Cole, 2009) as well as the important role of negative emotions (Gallo & Matthews, 2003) and self-regulatory processes (e.g., Kim et al., 2013; Taylor, Way, & Seeman, 2011) in contributing to this effect. For example, coping has been shown to moderate the relationship between stressful life events and internalizing symptoms in samples of adult women (Connor-Smith & Compas, 2002; Connor-Smith & Compas, 2004; Lee, 2003).

Furthermore, Chen et al. (2012) found that among adults who grew up in poverty, use of secondary control type strategies (e.g., reframing, positive thinking) were associated with reduced physiological risk. Specifically, Chen et al. (2012) examined the psychological characteristic of “shift and persist,” in which an individual employs a cognitive reappraisal strategy of reframing current stressors more positively (shifting), while simultaneously maintaining a positive or hopeful focus on the future (persisting). The authors measured the use of “shift” and “persist” strategies through questionnaires, and assessed participants’ cumulative allostatic load, or markers of physiological wear-and-tear known to be associated with chronic stress (McEwen, 1998), through measurements of cardiovascular functioning, sympathetic and

parasympathetic nervous system activity, hypothalamic-pituitary-adrenal axis activity, inflammation, lipid and general metabolic activity, and glucose metabolism. Results indicated that adults who were raised by parents with low educational attainment (a proxy for growing up in higher sociodemographic disadvantage households) had higher allostatic load scores than adults raised by parents with higher levels of formal education. An interactive effect was also found, such that among adults who grew up with higher sociodemographic disadvantage, those who engaged in high-shift *and* high-persist strategies had the lowest allostatic load, whereas shift-and-persist was not related to allostatic load among those who reported growing up in conditions of low sociodemographic disadvantage (Chen et al., 2012).

Previous research has also explicitly used the control-based model of coping to examine coping processes among parents faced with sociodemographic disadvantage. From this research, evidence for interactive effects of stress and coping on psychological distress is emerging from multiple studies conducted among low-income populations. Wadsworth, Raviv, Compas, and Connor-Smith (2005) tested associations among economic strain, life stress, and coping on psychological symptoms in a sample of rural, low-income parents and their adolescent children. Economic strain was uniquely predictive of depressive symptoms among parents, but coping moderated this effect. Specifically, primary and secondary control coping were negatively associated with parents' depressive symptoms, whereas disengagement coping was positively associated with symptoms. Moreover, the authors found significant interactive effects for primary control and disengagement coping with stress, providing initial evidence that coping may moderate the relationship between poverty-related stress and depressive symptoms among adults (Wadsworth et al., 2005).

Recent research on the Adaptation to Poverty-Related Stress model (Wadsworth, Raviv, Santiago, & Etter, 2011) has tested moderation analyses to further elucidate how processes of coping can mitigate or exacerbate the effects of sociodemographic disadvantage on psychosocial outcomes. The Adaptation to Poverty-Related Stress model builds upon the research demonstrating that stress is an important mechanism through which poverty confers risk for negative psychosocial outcomes among low-income populations, and incorporates both voluntary coping efforts and involuntary stress responses as essential factors in buffering or exacerbating this risk (Wadsworth et al., 2011).

Wadsworth and colleagues have conducted a series of studies demonstrating how primary control, secondary control, and disengagement coping interact with poverty-related stress to predict psychopathology. In an ethnically diverse sample of families living at or below 150% of the poverty line, main effects were found for primary and secondary control coping in predicting a variety of internalizing and externalizing syndromes in both children and adults. Further, secondary control coping interacted with poverty related stress to significantly account for anxious and depressive symptoms in family members (Wadsworth & Santiago, 2008). Findings reported by Wadsworth et al. (2011) corroborated that an interaction between secondary control coping and poverty related stress appears to be the most robust predictor of internalizing symptoms in both children and adults from low-income backgrounds. Specifically, the relationship between stress and symptoms is most pronounced among those low in secondary control coping, whereas high secondary control coping appears to offer a buffering effect. These relationships have also been shown to hold prospectively across time; i.e., the interaction between poverty-related stress and secondary control coping predicts internalizing symptoms 1

year later after controlling for initial symptoms, particularly among parents and females (Wadsworth et al., 2011).

Secondary control coping efforts may be particularly suited to coping with the many uncontrollable stressors that high sociodemographic disadvantage environments present. Because strategies such as cognitive reappraisal and acceptance can be employed anywhere, anytime, these skills may be most accessible and thus most useful, if effectively implemented. In contrast, the pervasive lack of opportunities for taking direct action to solve financial problems or even seek social support that characterize the psychosocial milieu of sociodemographic disadvantage (Schoon & Parsons, 2002; Whelan, 1993) may limit the effectiveness of primary control strategies when not also accompanied by necessary changes and assistance programs at the societal and institutional levels.

Current Study: Rationale and Hypotheses

The current study is designed to test the potential interactive and longitudinal associations of cumulative sociodemographic disadvantage, cancer-related stress, and coping with psychological adjustment among mothers of children with cancer. Factors related to sociodemographic disadvantage have garnered attention from leaders in the field of psychology as important correlates of psychosocial health (American Psychological Association Task Force on Socioeconomic Status, 2007). However, relatively few studies to date have rigorously examined sociodemographic disadvantage-related effects on psychosocial adjustment in pediatric populations. Further, no studies have attempted to integrate research on stress and coping processes endemic to both sociodemographic disadvantage and pediatric cancer into a single model. Although previous studies have shown that sociodemographic disadvantage is related to

increased distress among mothers of children with cancer (e.g., Bemis et al., 2015), and that coping moderates the relation of poverty related stress and distress among low income adults (e.g., Wadsworth et al., 2011), these two lines of research have remained separate, and significant gaps in our understanding of these processes remain. This has impeded the development of interventions that may be most appropriate and effective for parents facing childhood cancer within the context of sociodemographic disadvantage (Brown et al., 2008). In addition, previous studies of coping as a moderator of poverty-related stress have largely been conducted among entirely low-income samples, which precludes a complete understanding of potential variation in these processes when including multiple factors related to sociodemographic disadvantage or when considering effects across the broader gradient of sociodemographic disadvantage (Adler et al., 1994).

Thus the aim of the current study is to integrate and expand on these previously separate lines of inquiry regarding the etiology and maintenance of psychological distress among families facing extreme levels of stress. The present sample provides an opportunity to (a) incorporate into the pediatric oncology literature a much-needed examination of stress x coping interaction models that have shown to be effective in research on sociodemographic disadvantage, (b) incorporate into the poverty-related stress literature a test of whether varying levels and multiple factors of sociodemographic disadvantage interact with cancer-related stress and coping processes to affect psychological distress, and (c) examine these relationships using a prospective longitudinal design. This information will be vital in our ability to identify who among parents of children with cancer may be most at risk for psychopathology and under what conditions this effect takes hold. As such, this study will provide essential direction for screening

procedures, intervention strategies, and institutional policies that adequately address these families' psychosocial needs.

As noted above, sociodemographic disadvantage and cancer-related stress are each associated with psychological distress among mothers of children with cancer. Although sociodemographic disadvantage and cancer-related stress demonstrate small but significant correlations with one another (Bemis et al., 2015), many of the cancer-related stressors experienced by families (Rodriguez et al., 2012) are in fact largely independent of sociodemographic disadvantage (e.g., not knowing whether the child will recover, concerns about the late effects of treatment). Thus, a moderated model is likely best suited to elucidate the effects of sociodemographic disadvantage and cancer-related stress on mothers' psychological distress. That is, sociodemographic disadvantage and cancer related stress appear to be relatively independent of one another, and it is possible that the combination of these two factors would have a potent effect on psychological distress.

Further, the two relevant but thus far separate lines of literature on coping – parents' coping with a child's cancer, and parents' coping with sociodemographic disadvantage – also provide direction for hypotheses regarding a potential buffering effect of adequate coping with cancer-related stressors within the context of sociodemographic disadvantage. Specifically, while each type of coping appears to be related to distress among parents of children with cancer, strongest effects have been found for secondary control coping (e.g., Compas et al., 2015). Similarly, secondary control coping appears to be the most consistent and robust predictor of distress among parents coping with extreme economic hardship both cross-sectionally and over time (e.g., Wadsworth & Berger, 2003; Wadsworth et al., 2011). Therefore, use of secondary control coping appears to be the most likely to effectively mitigate the negative impact of both

sociodemographic disadvantage and cancer-related stress among mothers faced with a child's cancer diagnosis and treatment.

Accordingly, the current study tests a series of moderated (i.e., interaction) models in order to better understand the relationships between sociodemographic disadvantage, cancer-related stress, and secondary control coping as predictors of psychological distress (i.e., depressive symptoms) in mothers of children with cancer. Specifically, the goal is to examine interactive effects between sociodemographic disadvantage and cancer-related stress, as well as whether this relationship, in turn, is moderated by how mothers cope with stress related to their child's cancer. Four separate models will examine the main effects of sociodemographic disadvantage, cancer-related stress, and secondary control coping; the two-way interactive effects of sociodemographic disadvantage x cancer-related stress, sociodemographic disadvantage x secondary control coping, and cancer-related stress x secondary control coping; and the three-way interaction among these three variables. Interpretations will be based on the most complex model supported (i.e., will focus on a significant three-way interaction when present, while two-way interactions and main effects, respectively, will be prioritized only when the more complex model is not significant).

It is predicted that the combination of these three variables will confer the most pronounced effect on psychological distress among mothers of children with cancer, such that the greatest risk for increased depressive symptoms will be associated with a combination of high sociodemographic disadvantage, high cancer-related stress, and low use of secondary control coping strategies. Following from research that has demonstrated lasting interactive effects between coping and sociodemographic disadvantage across time (Wadsworth & Berger, 2003), it is further predicted that the interaction of sociodemographic disadvantage x cancer-

related stress x secondary control coping will be significantly related to mothers' depressive symptoms at the time of a child's cancer diagnosis, at 12 months following diagnosis (controlling for baseline levels of symptom), and from baseline to 12 months (Figure 1).

The following hypotheses will be tested in four separate sets of linear multiple regression analyses, (1) in cross-sectional analyses with respect to mothers' depressive symptoms near the time of their child's diagnosis; (2) in cross-sectional analyses with respect to mothers' depressive symptoms 12-months after their child's diagnosis; (3) in longitudinal analyses with respect to mother's coping and depressive symptoms 12-months after the child's diagnosis, controlling for initial levels of depressive symptoms; and (4) in longitudinal analyses across time points (i.e., sociodemographic disadvantage, cancer-related stress, and coping at baseline predicting mothers' depressive symptoms at 12-months):

1. *Main effects*: sociodemographic disadvantage, cancer-related stress, and secondary control coping will each be significantly associated with mothers' depressive symptoms.

1a. Greater levels of sociodemographic disadvantage will be positively related to depressive symptoms.

1b. Greater levels of cancer-related stress will be positively related to depressive symptoms.

1d. Greater use of secondary control coping will be negatively related to depressive symptoms.

2. *Two-way interaction effects*: It is further expected that the effects of sociodemographic disadvantage, cancer-related stress, and secondary control coping on mothers' depressive symptoms are multiplicative in nature. The following hypotheses will be tested with regard to each potential two-way interaction:

2a. Sociodemographic disadvantage x cancer-related stress: The effect of sociodemographic disadvantage on depressive symptoms will be greatest among mothers with increased levels of cancer-related stress.

2b. Sociodemographic disadvantage x secondary control coping: Mothers with high levels of sociodemographic disadvantage and low levels of secondary control coping will report significantly greater levels of depressive symptoms, whereas the relationship between sociodemographic disadvantage and depressive symptoms will be non-significant among mothers who report high levels of secondary control coping.

2c. Cancer-related stress x secondary control coping: The positive association between cancer-related stress and symptoms of depression will be strongest among mothers who report low levels of secondary control coping; whereas the relationship between cancer-related stress and depressive symptoms will be non-significant among mothers who report high levels of secondary control coping.

3. *Three-way interaction effect*: Given that sociodemographically disadvantaged mothers of children with cancer may have the least opportunities to control the stressors they are faced with, it is hypothesized that secondary control coping will be most beneficial among sociodemographically disadvantaged mothers experiencing high levels of cancer-related stress.

Thus, a three-way interaction model will be used to test the following hypothesis:

3a. There will be a significant sociodemographic disadvantage x cancer-related stress x secondary control coping interaction, such that the greatest levels of depressive symptoms will be significantly predicted by the combination of high levels of sociodemographic disadvantage, high levels cancer-related stress, and low levels secondary control coping.

CHAPTER II

METHOD

Participants

Participants were 209 mothers of children recently diagnosed with cancer. Participants were recruited from cancer registries at two pediatric hospitals in the Midwestern and Southern United States as part of a larger study of family adjustment to childhood cancer. Eligible mothers had children who (a) were ages 5–17 years old; (b) had a new cancer diagnosis or relapse/recurrence of initial cancer diagnosis (i.e., child’s treatment progressed to maintenance phase or further and initial diagnosis recurred) within the previous 6 months; (c) were actively receiving treatment through the oncology division; and (d) had no pre-existing developmental disability. Mothers who participated in the study at both time 1 (T1) and time 2 (T2) were included in the present sample.

Demographic characteristics of the sample are shown in Table 1. Mothers ranged from ages 23 to 59 years old ($M = 37.9$; $SD = 7.0$) and completed a mean of 14.2 years of education ($SD = 2.4$; range = 7-22). Participants represented a variety of annual family income levels: 24.4% earned \$25,000 or under; 30.6% earned between \$25,001 and \$50,000; 16.7% earned between \$50,001 and \$75,000; 12.9% earned between \$75,001 and \$100,000; and 14.8% earned over \$100,000 (0.5% did not provide information regarding income). The sample was 85.6% White/Caucasian; 7.7% Black/African-American; 1.4% Asian American; and 5.3% of other races; 5.7% ($N = 12$) identified as Hispanic/Latino. The sample comprised 154 (73.7%) mothers who were partnered (married or living with someone as if married) and 55 (26.3%) not partnered (single, divorced, separated, or widowed; referred to as “single” in the remainder of this paper).

Participants' children were on average 10.5 years old ($SD = 4.0$) at the time of diagnosis and 55% ($N = 115$) were male. Mothers' children received cancer diagnoses including leukemia (35.9%; $N = 75$), lymphoma (27.3%; $N = 57$), brain tumors (7.2%; $N = 15$) and other solid tumor (29.7%; $N = 62$). Mothers of children with new diagnoses comprised 94.3% of the sample ($N = 197$); there were no significant differences in enrollment or completion time based on the child's first-time diagnosis versus relapse status.

Measures

Demographic and Medical Data. Parents provided demographic data on age, race, ethnicity, years of education, annual family income, and relationship status. Participants also gave permission for research staff to review the child's medical records for information on their cancer diagnosis.

Sociodemographic Disadvantage. Using participants' demographic information, a cumulative sociodemographic disadvantage measure was created to assess the impact of sociodemographic factors. Numerous studies of psychological adjustment support the theory of cumulative sociodemographic disadvantage-related risk, and it has been suggested that this type of assessment provides an effective indication of the potential collective effects of sociodemographic factors (e.g., Brody et al., 2013; Doan et al., 2012; Evans & Kim, 2013; Kim & Brody, 2005; Rutter, 1979). Cumulative sociodemographic disadvantage has also been highlighted as a robust indicator of risk for psychological maladjustment among children with cancer and their mothers (Bemis et al., 2015; Bemis, 2015). Following guidelines set by previous research (e.g., Brody et al., 2013; Bemis et al., 2015; Doan et al., 2012), this measure included the following indices of sociodemographic disadvantage, with each risk factor scored dichotomously

(0 if absent, 1 if present): family income \leq \$25,000 (reflecting the lowest income bracket in our sample, and approximating the poverty level for a family of four in the United States); single parenthood; mothers' education level \leq 12th grade. The distribution of total sociodemographic disadvantage scores for the sample is presented in Table 1.

The cutoffs were selected based on those used in a previously published study examining cumulative sociodemographic disadvantage among mothers of children with cancer (Bemis et al., 2015) and reflect the methodology used in the general literature on sociodemographic disadvantage-related effects on psychological outcomes (e.g., Brody et al., 2013; Doan et al., 2012; Evans, Li, & Whipple, 2013). Further, a single continuous sociodemographic disadvantage variable streamlines analyses by reducing the total number of independent variables in the model, and provides the most comprehensive indication of mothers' total cumulative levels of sociodemographic disadvantage.

Cancer-Related Stress. Participants completed the stressor items from the Responses to Stress Questionnaire-Pediatric Cancer Version (RSQ-PC; Miller et al., 2009; Rodriguez et al., 2012) to assess the experience of stressors specific to having a child with cancer. The stressor items from the RSQ-PC include a list of 12 cancer-related stressors (e.g., disruptions in daily role functioning, communication with their child about cancer, cancer caregiving). Stressor items were developed in respect to previous research and the research team's clinical experience with families facing childhood cancer. Participants rate how stressful each of 12 items has been recently on a scale from 1 (Not at all) to 4 (Very). Internal consistency for the total RSQ Stressor score in the current sample was .83 at T1 and .84 at T2.

Coping. To assess coping responses to stressors related to having a child with cancer, mothers completed a version of the Responses to Stress Questionnaire-Pediatric Cancer version

(RSQ-PC; Connor-Smith et al., 2000; Miller et al., 2009; Rodriguez et al., 2012). The RSQ has been shown to have satisfactory psychometric properties among adult samples (Compas et al., 2006; Wadsworth et al., 2005). The RSQ-PC includes 57 items on which participants indicate on a 4-point scale how much they use various coping methods, from 0 (not at all) to 4 (a lot), in response to the 11 stressors related to their child's cancer discussed above. Factor analyses of the RSQ have identified five factors: primary control engagement coping (problem solving, emotional expression, emotional modulation), secondary control engagement coping (cognitive restructuring, positive thinking, acceptance, distraction), disengagement coping (avoidance, denial, wishful thinking); two additional scales reflect involuntary stress responses.

Based on previous research that suggests that the strongest evidence for the current hypotheses lies with secondary control coping in particular (e.g., Compas et al., 2015; Wadsworth et al., 2005), the present study focused specifically on the *secondary control coping* scale. Proportion scores were created by dividing the total score for each factor by the total score for the RSQ (Connor-Smith et al., 2000; Osowiecki & Compas, 1999) and the secondary control coping proportion score was used in the current analyses to control for response bias (i.e., to control for “yea” saying in endorsing high levels of all forms of coping).

Depressive Symptoms. Mothers' depressive symptoms at T1 and T2 were used as the dependent variables. Depressive symptoms are considered a representative indicator of psychological distress and have commonly been assessed among parents of children with cancer (e.g., Compas et al., 2015; Pai et al., 2007). Mothers completed the Beck Depression Inventory-II as a measure of current depressive symptoms (BDI-II; Beck, Steer, & Brown, 1996). This instrument 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).

Procedure

As part of a larger parent study of families of children with cancer, a total of 386 caregivers were approached at time 1 (T1), on average 2 months after the diagnosis or relapse of their child's cancer ($M = 2.04$; $SD = 1.59$ months). Caregivers were seen at the two research sites in the outpatient hematology/oncology clinics or in inpatient rooms by a member of the research team and were given questionnaire packets that they completed in the hospital, outpatient clinic, or took home and returned at a subsequent visit. Of the 386 families approached, 336 provided consent. A total of 284 mothers who were the primary caregiver of the child provided data on key study variables at T1.

Approximately 12 months later (time 2; T2), mothers were asked to complete the same questionnaires. On average, T2 assessments were collected 12 months after T1 and 13.89 months ($SD = 2.43$) after diagnosis. At T2, 51.5% of mothers had children still currently receiving treatment, while 46% were off treatment; treatment information was not available for 2.6% of families; this was largely due to lack of access to medical records when a child's treatment was transferred to another center. Eighty-seven mothers were lost to follow-up between T1 and T2 (26.4%), resulting in a T2 sample size of $N = 209$. Though some mothers' children passed away after the mothers were initially enrolled in the study, these mothers were not included in the current study and are not reflected in the sample at T1 or T2.

The Institutional Review Boards at both sites have approved the study protocol. Families were compensated \$50 for completion of the study questionnaires at each time point. Variation in the time at which parents completed their questionnaires occurred based on the timing of

communication of the diagnosis from the medical team to the research team, parents' availability to hear about the study, and parents' needing time to consider the study before consenting.

Reasons for attrition included being unable to reach family, no longer wanting to participate due to time constraints or severity of child's illness, or switching care to another hospital.

Attrition was not significantly related to any key study variable, including mothers' sociodemographic disadvantage, T1 cancer-related stress on the RSQ, T1 secondary control coping, or T1 depressive symptoms on the BDI-II. Therefore, following methodological procedures of the longitudinal studies on which the current hypotheses are based (Santiago, Wadsworth, & Stump, 2011; Wadsworth et al., 2011)¹ it was concluded that data were missing at random and additional covariates of missingness were not included in the data analyses. To draw on the most consistent version of the sample across analyses, only mothers who completed data at both time points were included in the current study, thus reflecting a total study sample of $N = 209$ for all analyses. This sample size is well above the minimum recommended ($N = 109$) to detect effects in a regression model with 8 predictors (Green, 1991).

Statistical Analyses

Analyses were conducted in SPSS (version 23). Preliminary analyses consisted of a series of Pearson bivariate correlations, independent samples *t*-tests, and dependent samples *t*-tests to test the bivariate associations between the independent and dependent variables at each time point and to examine changes in participants' scores from T1 to T2.

A total of four linear regression models were used to test the effects of the three-way interaction, the two-way interactions, and the main effects of sociodemographic disadvantage,

¹ Each of these studies reflect an attrition rate of 30% over the course of one year; attrition analyses revealed no significant completion difference on any key study variable.

cancer related stress, and secondary control coping on mothers' depressive symptoms at each time point. The first two models tested cross-sectional effects: (1) The first model predicted T1 depressive symptoms from T1 independent variables (sociodemographic disadvantage, cancer-related stress, secondary control coping, and the two- and three-way interaction terms); (2) the second model predicted T2 depressive symptoms from T2 independent variables. The second two models tested longitudinal effects: (3) the third model predicted T2 depressive symptoms from T2 independent variables, controlling for T1 depressive symptoms; and (4) the fourth model predicted T2 depressive symptoms from T1 independent variables while also controlling for T1 depressive symptoms (see Figure 1).

For each moderation model, all independent variables were centered by subtracting the sample mean from each individual score and both the centered variables and their products were included in the analyses. The relevant centered independent variables, their two-way interaction terms, and their three-way interaction terms were entered together in a single step. Following standard guidelines for interpreting effects in moderated models (e.g., Hayes, 2013), interpretations were driven by the most complex model supported; i.e., two-way interactions were examined only when the three-way interaction was not significant in the original model, and main effects for an independent variable were interpreted only when no three-way or two-way interactions involving the variable were significant.

Post-hoc probing for significant interactions was conducted using the Process macro written for SPSS (Hayes, 2013), which uses a bootstrapping approach to ascertain conditional effect sizes and significance at the mean and $\pm 1 SD$ for each moderating variable. To further assist with interpreting results and determining whether simple slopes were significantly different from zero, each significant interaction was also plotted separately, using the mean-

centered variables, at high and low values (i.e., $\pm 1 SD$ from the mean) of the moderators (Aiken & West, 1991; Hayes, 2013; Holmbeck, 2002).

CHAPTER III

RESULTS

Preliminary Analyses

Means and standard deviations for all T1 and T2 variables are presented in Table 2. At T1, mothers' mean BDI-II score ($M = 14.37$; $SD = 10.33$) was in the mild range for depressive symptoms (Beck et al., 1996). T1 depressive symptom levels were in the moderate to severe range for 29.6% of the sample (total score >19 ; Beck et al., 1996). At T2, mothers' mean BDI-II score was in the minimal range ($M = 11.93$; $SD = 10.39$), while 25.1% of the sample reported moderate to severe symptom levels. Results of paired samples t tests indicated that mean levels of mothers' depressive symptoms, $t(198) = 3.51, p < .01$, and cancer-related stress, $t(198) = 8.89, p < .01$, significantly decreased from T1 to T2. In contrast, mothers' use of secondary control coping significantly increased from T1 to T2, $t(198) = -2.85, p < .01$.

A T2 cumulative sociodemographic disadvantage variable created with demographic information provided by mothers at T2 (using the same procedure described in the Methods section above) was significantly and strongly correlated with mothers' T1 sociodemographic disadvantage score ($r = .87; p < .001$). There was also no significant difference on cumulative sociodemographic disadvantage score or any of the independent variables comprising the measure (relationship status, education, family income) between time points. Thus, T1 sociodemographic disadvantage (termed simply "sociodemographic disadvantage" throughout the rest of this paper) was used for all subsequent analyses.

Results of Pearson bivariate correlations are shown in Table 2. As expected, both within and across time points, sociodemographic disadvantage and cancer-related stress were each

positively correlated with mothers' depressive symptoms, while secondary control coping was negatively correlated with mothers' depressive symptoms (see Table 2). In addition, sociodemographic disadvantage and cancer-related stress were both negatively correlated with secondary control coping at each time point. Of note, mothers' T1 depressive symptoms were strongly positively correlated with their depressive symptoms at T2. Further, mothers' T1 depressive symptoms were also positively correlated with their cancer-related stress and negatively correlated with their secondary control coping one year later (see Table 2).

Cross-Sectional Moderation Analyses

Model 1 (Time 1)

The model predicting mothers' depressive symptoms at T1 included sociodemographic disadvantage, T1 cancer-related stress, T1 secondary control coping; the three two-way interaction terms of these variables; and the three-way interaction term of these variables (Table 3). The full model was significant, Adjusted $R^2 = .50$, $F(7, 195) = 29.80$, $p < .001$, and a significant three-way interaction emerged (see Table 3). Post-hoc probing revealed a significant conditional effect of sociodemographic disadvantage on mothers' BDI-II at the value of +1 standard deviation for cancer-related stress and -1 standard deviation for secondary control coping ($B = 2.42$, $SE = .83$, $p < .01$), such that the highest levels of depressive symptoms were found among mothers with high levels of sociodemographic disadvantage, high levels of cancer-related stress, and low levels of secondary control coping (see Figure 2).

Although significant effects were found for one of the two-way interactions and two of the main effects in the full model, per the guidelines described in the methods section (e.g.,

Hayes, 2013) these effects were not considered to be meaningful given that the three-way integration was significant, and were not interpreted.

Model 2 (Time 2)

The cross-sectional model predicting mothers' depressive symptoms at T2 included sociodemographic disadvantage, T2 cancer-related stress, T2 secondary control coping; the three two-way interaction terms of these variables; and the three-way interaction term of these variables (Table 4). In the full model, the three-way interaction of sociodemographic disadvantage x T2 cancer-related stress x T2 secondary control coping was not significant (see Table 4). Thus the three-way interaction was removed from the model. When the three-way interaction was removed, the overall model was significant (Adjusted $R^2 = .40$, $F(6, 183) = 21.98$, $p < .001$) and two of the two-way interactions were significant. Specifically, the two-way interaction terms for T2 sociodemographic disadvantage x T2 secondary control coping and T2 cancer-related stress x T2 secondary control coping each significantly accounted for mothers' depressive symptoms (see Table 4). The interaction of sociodemographic disadvantage x T2 cancer-related stress was not significant.

Post-hoc probing revealed that the nature of the interaction of sociodemographic disadvantage x T2 secondary control coping was such that there was a significant positive relationship between mothers' sociodemographic disadvantage and depressive symptoms specifically at low levels (-1 *SD* below the mean) of secondary control coping ($B = 2.32$, $SE = .78$, $p < .01$; see Figure 3); in contrast, there was no significant effect of sociodemographic disadvantage on depressive symptoms among mothers who reported high levels (+1 *SD* above the mean) of secondary control coping. The two-way interaction of cancer-related stress x

secondary control coping followed a similar pattern: the positive relationship between cancer-related stress and depressive symptoms was significant among mothers with levels of secondary control coping at -1 SD below the mean ($B = .38, SE = .14, p < .01$) as well as among those with mean levels of secondary control coping ($B = .24, SE = .10, p < .05$); however there was no significant effect of cancer-related stress on depressive symptoms among mothers with high levels (+1 SD above the mean) of secondary control coping (see Figure 4). The main effects in the model were not interpreted given that each independent variable was involved in a significant two-way interaction.

Longitudinal Moderation Analyses

Model 3 (Time 2 independent variables predicting Time 2 depressive symptoms, controlling for Time 1 depressive symptoms)

The third model predicted mothers' depressive symptoms at T2 from sociodemographic disadvantage, T2 cancer-related stress, T2 secondary control coping; the three two-way interaction terms of these variables; and the three-way interaction term of these variables; in addition, mothers' T1 depressive symptoms was entered as a control variable (Table 5). The three-way interaction was not significant and was thus removed from the model. The two-way interaction of sociodemographic disadvantage x T2 secondary control coping emerged as a significant predictor of mothers' depressive symptoms at T2 (see Table 5). Likewise, the two-way interaction of T2 cancer-related stress x T2 secondary control coping was a significant predictor the full model and remained significant when the three-way interaction was removed (see Table 5). The main effect for mothers' T1 depressive symptoms was also significant. The

model testing the two-way interactions was significant, Adjusted $R^2 = .55$, $F(7, 180) = 31.01$, $p < .001$.

Post-hoc probing was conducted for each of the significant two-way interactions, controlling for mothers' T1 depressive symptoms. Conditional effect analyses revealed that the relationship between sociodemographic disadvantage and T2 depressive symptoms was significant specifically among mothers who reported low levels of secondary control coping at T2 ($B = 2.31$, $SE = .78$, $p < .01$). Similarly, the relationship between T2 cancer-related stress and T2 depressive symptoms was significant among mothers who reported low ($B = .41$, $SE = .09$, $p < .001$) and mean ($B = .27$, $SE = .08$, $p < .01$) levels of secondary control coping, whereas there was no relationship between T2 cancer-related stress and T2 depressive symptoms among mothers with high levels of secondary control coping at T2 (see Figure 6).

Model 4 (Time 1 independent variables predicting Time 2 depressive symptoms)

The fourth full model longitudinally predicted mothers' depressive symptoms at T2 from sociodemographic disadvantage, T1 cancer-related stress, T1 secondary control coping; the three two-way interaction terms of these variables; and the three-way interaction term of these variables; T1 BDI-II was also included as a control variable (Table 6). Though the full model was significant, none of the three- or two-way interaction terms were significant, while mothers' T1 depressive symptom level was the only significant predictor of mothers' T2 depressive symptoms in the full model (see Table 6). When the three-way interaction term was removed from the model, none of the two-way interactions emerged as significant predictors; however, the main effect for T1 secondary control coping was significant along with T1 depressive symptoms and the model was significant (see Table 6).

When the non-significant two-way interactions were removed from the model, the main effects model was significant and the pattern of significance for the main effects remained the same as the previous version of the model: mothers' T1 secondary control coping and T1 depressive symptoms were significant longitudinal predictors of their depressive symptoms at T2. The effects for sociodemographic disadvantage and T1 cancer-related stress were not significant (see Table 6).

CHAPTER IV

DISCUSSION

The purpose of the present study was to synthesize and expand upon two previously separate lines of research on psychological distress among parents coping with significant sources of stress: mothers coping with a child's cancer diagnosis and treatment within the context of sociodemographic disadvantage. This study is the first of its kind to integrate research on stress and coping processes common to both sociodemographic disadvantage and pediatric cancer into a single model. In doing so, this research provides important information for efforts to assist families facing these burdens.

Childhood cancer and its treatment presents mothers with a range of significant stressors (e.g., Rodriguez et al., 2012) and places a significant subset of parents at risk for heightened symptoms of psychological distress, including depressive symptoms (e.g., Pai et al., 2007). Prior work has primarily highlighted rates of distress among children with cancer and their parents, while limited research has examined who among this population might be most likely comprise the subset of those experiencing significant levels of psychological distress or precisely what factors may serve to exacerbate or mitigate risk for distress. In particular, it is important to remember that some parents are facing their child's cancer on top of additional, contextual burdens related to sociodemographic disadvantage (e.g., from backgrounds of low income, low educational attainment, and/or single parenthood). Approximately 15% of the U.S. population is living in poverty (a figure that drastically increases to 48% when considering single mothers; U.S. Census Bureau, 2012) and an extensive body of literature demonstrates the profound

negative psychological toll of living under conditions of sociodemographic disadvantage (e.g., Adler et al., 1994; Evans & Kim, 2013; Gallo & Matthews, 2003; Matthews & Gallo, 2011).

However, despite calls to consider the broader ecological context of childhood cancer (Brown et al., 2008; Kazak, 2001) and increasing evidence that sociodemographic factors impact stress and distress among parents of children with cancer (e.g., Bemis et al., 2015), to date these factors have generally been overlooked in the pediatric psychology literature. Accordingly, a fundamental goal of the present research was to highlight the importance of sociodemographic disadvantage as a dynamic risk factor that warrants attention beyond the position of a control variable.

Furthermore, two previously separate literatures on coping processes have provided direction for further investigation of the conditions under which the effects of sociodemographic disadvantage may take hold. Specifically, secondary control coping (i.e. acceptance, cognitive reappraisal, positive thinking; Connor-Smith et al., 2000) has shown to be related to lower levels of distress among mothers facing a child's cancer diagnosis (Compas et al., 2015) as well as a moderator of distress in prospective studies of mothers facing extreme economic hardship (Santiago et al., 2011; Wadsworth et al., 2011). These strategies, which capture efforts to adapt to a source of stress, may be particularly well-suited to mothers facing the high levels of uncontrollable stress endemic to both childhood cancer and sociodemographic disadvantage.

In order to better understand these contextual and personal risk factors for distress among mothers of children with cancer, the current study examined the main, two-way, and three-way interactive effects of sociodemographic disadvantage, cancer-related stress, and secondary control coping both near the time of diagnosis and one year later. In particular, the study examined the potential effectiveness of secondary control coping strategies in managing cancer-

related stress within the context of sociodemographic disadvantage. It was predicted that the greatest risk for increased depressive symptoms would be associated with a combination of high sociodemographic disadvantage, high cancer-related stress, and low use of secondary control coping strategies. Four separate models were used to assess these relationships with respect to various points in time: (1) in cross-sectional analyses with respect to mothers' depressive symptoms near the time of their child's diagnosis; (2) in cross-sectional analyses with respect to mothers' depressive symptoms 12-months after their child's diagnosis; (3) in longitudinal analyses with respect to mother's coping and depressive symptoms 12-months after the child's diagnosis, controlling for initial levels of depressive symptoms; and (4) in longitudinal analyses across time points (i.e., sociodemographic disadvantage, cancer-related stress, and coping at baseline predicting mothers' depressive symptoms at 12-months, controlling for baseline depressive symptoms). Two-way interactions and main effects for these variables were examined in cases where the three-way interaction was not significant.

Summary of Findings and Interpretations

Preliminary analyses revealed that on average, mothers' depressive symptom levels decreased from diagnosis to 12-months, however this effect was small. Mothers' relative symptom levels were also quite stable, as the effect size for the correlation between T1 and T2 depressive symptoms was large. A significant subset of the sample demonstrated clinically significant levels of depressive symptoms at each time point, with 29.6% of the sample at T1 and a quarter of the sample (25.1%) at T2 reporting moderate to severe symptom levels. Mothers' use of secondary control coping increased from T1 to T2, though the effect for this increase was small and the large effect size of the correlation between time points also demonstrated relative

stability. In contrast, mothers' cancer-related stress significantly decreased by approximately three-quarters of a standard deviation, demonstrating a large effect for the difference in mothers' levels of stress from the time of diagnosis to 12 months later.

In bivariate analyses, twenty out of twenty-one correlations between study variables were significant (Table 2), all in the expected directions: both within and across time points, sociodemographic disadvantage and cancer-related stress were each associated with increased depressive symptom levels, whereas secondary control coping was associated with lower levels of depressive symptoms. It is also notable that mothers' depressive symptoms at T1 were related to heightened cancer-related stress and less adequate coping at T2. In addition to the strong association with T2 depressive symptoms, this prospective association of mothers' depressive symptoms at baseline to functioning 12-months later may suggest that early intervention efforts would have a robust and lasting impact on mothers' psychological outcomes through the course of their child's cancer treatment.

Model 1 (Time 1)

As hypothesized, a significant three-way interaction was detected at T1 such that the combination of high levels sociodemographic disadvantage, high levels of cancer-related stress, and low levels secondary control coping was associated with the greatest levels of depressive symptoms among mothers. Conversely, the results demonstrated a buffering effect for secondary control coping, in which even among mothers with high sociodemographic- and stress-related risk there was no significant association with depressive symptoms among those who reported high levels of secondary control coping.

This result is consistent with a broader literature showing that secondary control coping moderates the relationship between stress and psychological distress (e.g., Connor-Smith & Compas, 2002; Connor-Smith & Compas, 2004; Lee, 2003), including among mothers faced with economic hardship (Wadsworth et al., 2005; Wadsworth et al., 2011; Wadsworth & Santiago, 2008). Building on this previous research, the present study is the first to demonstrate this effect among mothers of children with cancer or to test a three-way interaction effect by including both sociodemographic disadvantage and cancer-related stress in a single moderation model. This study provides further evidence that sociodemographic factors should be considered when implementing screening procedures for psychological distress, and that mothers from backgrounds characterized by greater disadvantage and mothers reporting high levels of cancer-related stress should be among the highest priority for inclusion in programmatic efforts to reduce families' distress near the time of a child's cancer diagnosis (Bemis et al., 2015). Furthermore, the results suggest that teaching of secondary control coping skills will be a critical component of early intervention among high-risk mothers, as these skills appear to have a profound influence on resilience to stress in the initial weeks and months following diagnosis.

Model 2 (Time 2)

In the cross-sectional analyses at T2, partial support was found for the interaction hypotheses, and the findings at T1 were partially replicated at T2. The three-way interaction of sociodemographic disadvantage x T2 cancer-related stress x T2 secondary control coping was not significant; however, each independent variable was involved in a significant two-way interaction accounting for mothers' T2 depressive symptoms. Specifically, secondary control coping separately moderated the effects of sociodemographic disadvantage and cancer-related

stress. The pattern was very similar to the cross-sectional analyses at T1: sociodemographic disadvantage was conditionally related to depressive symptoms among mothers reporting low levels of secondary control coping; cancer-related stress was conditionally related to depressive symptoms among mothers reporting low to average levels of secondary control coping. High levels of secondary control coping served a protective role in each of these two-way interactions.

The interaction of sociodemographic disadvantage x cancer-related stress was not significant at T2; rather, each of these variables were separately moderated by mothers' secondary control coping. This result, which differs somewhat from the pattern identified at T1, suggests that the respective impacts of sociodemographic disadvantage and cancer-related stress each exert independent effects on depressive symptoms at 12 months post diagnosis. At the time of diagnosis the two factors combine (interact) to significantly increase risk for psychological distress, particularly among mothers low in secondary control coping. However, levels of cancer-related stress significantly decreased one year later. At this time more mothers may be below a threshold level of stress at which the combination of these two factors significantly takes hold to impact adjustment. Rather, experiencing high levels of either these factors, in conjunction with inadequate use of secondary control coping, produces a more pronounced effect.

It is particularly notable that among mothers experiencing high levels cancer-related stress, only the highest levels of secondary control coping served as a successful buffer from distress while even average levels of these skills conferred risk for increased depressive symptoms. In addition to highlighting the need to continue to be cognizant of sociodemographic disadvantage and heightened levels of stress as important risk factors one year post diagnosis, this result further emphasizes the need to intensively target secondary control coping skills

among vulnerable mothers in order to ensure that these strategies can be used in the most effective manner possible during the course of their child's cancer treatment.

Model 3 (Time 2, controlling for time 1 depressive symptoms)

In the first longitudinal model, independent variables at T2 were used to assess mothers' T2 depressive symptoms while controlling for mothers' T1 depressive symptoms. With this control the interaction hypotheses were partially supported and the results replicated those in Model 2. The three-way interaction was not a significant predictor of mothers' depressive symptoms. However, the two-way interaction of cancer-related stress x secondary control coping was significant in the full model as well as when the three-way interaction term was removed. Likewise, the interaction of sociodemographic disadvantage x secondary control coping was also significant in the two-way interaction model. Again, sociodemographic disadvantage and cancer-related stress were each associated with mothers' depressive symptoms specifically at low levels of secondary control coping at T2.

Thus the moderating effect of secondary control coping persists in longitudinal analyses, and the effect holds when controlling for the highly stable relationship of mothers' initial levels depressive symptoms to their symptoms one year later. This is consistent with previous studies in which an interaction between poverty-related stress and secondary control coping predicted changes in mothers' internalizing symptoms when controlling for symptoms one year prior (Santiago et al., 2011; Wadsworth et al., 2011). These results indicate that the use of secondary control coping skills confers a robust ability to mitigate risk for distress among mothers facing high levels of cancer-related stress and mothers coping with their child's cancer treatment within the context of sociodemographic disadvantage. Of note, mothers' T1 depressive symptoms was

the strongest predictor of symptoms at T2 and emerged as a significant main effect in each of the interaction models – which again highlights the potential utility of early intervention in order to affect not only initial distress, but perhaps also to prospectively promote mothers’ psychological well-being over the course of treatment.

Model 4 (Time 1 variables predicting time 2 depressive symptoms)

In the longitudinal model predicting mothers’ T2 depressive symptoms prospectively from T1 independent variables (including T1 depressive symptoms as a control), the hypotheses regarding interaction effects were not supported. In addition to mothers’ baseline depressive symptoms, the main effect for mothers’ T1 secondary control coping emerged as the only significant predictor of depressive symptoms at 12-months. Though this result is somewhat inconsistent with Wadsworth et al. (2011)’s finding of a prospective moderating effect for secondary control coping, it is important to bear in mind that the Adaptation to Poverty Related Stress Model posited by Wadsworth et al. (2011) focuses on poverty-related stress whereas the current study diverges from this model by examining cancer-related stress as well as socioeconomic disadvantage.

Interestingly, despite being significantly associated with T2 depressive symptoms in bivariate analyses, neither sociodemographic disadvantage nor T1 cancer-related were significant predictors of mothers’ T2 depressive in the main effects regression model. Though sociodemographic disadvantage and cancer-related stress are demonstratively important factors at each time point, mothers’ depressive symptoms and use of secondary control coping at the time of their child’s cancer diagnosis appear to be the *most* powerful predictors of their distress 12-months later. For example, among mothers who demonstrate heightened levels of depressive

symptoms shortly following their child's cancer diagnosis, it appears that the relative impact sociodemographic disadvantage and/or cancer-related stress, though likely highly salient, do not necessarily account for significant additional variance in contributing to the maintenance of these symptoms over the course of treatment. On the other hand, appropriate use of secondary control coping may be a useful strategy for reducing distress over time. This result paints an encouraging picture for interventionists, as secondary control coping is also arguably the most easily targeted of these study variables when considering potential avenues for change.

Implications for Intervention and Policy

Overall, the results of the present study highlight the need to develop and test a targeted intervention for mothers of children with cancer that is expressly designed to accommodate mothers from backgrounds of sociodemographic disadvantage. Moving forward, it will be important to synthesize and incorporate research on coping with the stressors related to childhood cancer (Compas et al., 2012) and models of resilience to the adversities related to sociodemographic disadvantage (e.g., Chen & Miller, 2013) into informed clinical interventions specifically focused on the needs of sociodemographically disadvantaged families facing a child's illness. Efforts have been made to develop psychological interventions for families of children with cancer, including interventions to build coping and problem-solving skills near the time of diagnosis (e.g., Askins et al., 2009; Stehl et al., 2009). However, the success of these efforts has been somewhat limited thus far and further intervention research is needed (Peek & Melnyk, 2010), particularly with regard to adequately incorporating issues of diversity into empirically supported psychosocial treatments in pediatric populations (Clay, Mordhorst, & Lehn, 2002). A useful direction for this endeavor is provided from existing interventions to

reduce psychosocial stress in families faced with economic hardship (Wadsworth, Santiago, Einhorn, Etter, Rienks, & Markman, 2011). Integrating the current interventions in these two areas of the field will be vital in any future trials aiming to increase the acceptability, feasibility, efficacy, and generalizability of interventions for families facing childhood cancer.

The present results also suggest that including a strong focus on secondary control coping skills in the content of such an intervention could be highly effective in reducing overall rates of depressive symptoms among mothers of children with cancer. It is notable that mothers reporting that they used high levels of secondary control coping were those who demonstrated significant resilience (i.e., significantly lower levels of depressive symptoms) even in the face of increased sociodemographic disadvantage *and* cancer-related stress. In addition, consistent with previous research suggesting that sociodemographic disadvantage impinges on one's ability to adaptively cope with stress (e.g., Evans & Kim, 2013; Jaser et al., 2014; Gallo et al., 2005; Wolff et al., 2010) mothers from backgrounds of sociodemographic disadvantage were less likely to engage in secondary control coping strategies, further supporting the potential importance of teaching these skills in a targeted intervention. Secondary control coping skills, while perhaps somewhat more abstract and difficult to learn and use effectively than other skills such as problem solving, are particularly conducive to adaptive management of uncontrollable stressors which arise in abundance in the contexts of childhood cancer as well as sociodemographic disadvantage.

In contrast, opportunities to more directly manage stressors (e.g., through problem solving) may be more limited for families facing a child's cancer diagnosis within the context of sociodemographic disadvantage. For example, there are unfortunately relatively few options for a parent to tangibly reduce the financial load of a child's cancer treatment. However, at the institutional and policy levels many more of these issues are potentially within the realm of

control; the results of this study can be used to advocate for increased efforts to mitigate the practical burdens of childhood cancer on families. For example, assistance programs such as free financial counseling for families, provision of child care for healthy siblings, and assistance with transportation could be effective in reducing overall levels of cancer-related stress among parents of children with cancer. Psycho-educational programs for medical providers could also increase awareness of the impact of sociodemographic disadvantage for early screening, as well as increase providers' ability to reduce stress through the use of appropriately tailored communication strategies when discussing important cancer-related information with parents.

Together these types of programs would have the potential to reduce the overall risk for – and healthcare system burden of – depressive symptoms in mothers. Given that parents of children with cancer carry the additional responsibility of providing information and emotional support and advocating for their child (Kars, Duijnste, Pool, van Delden, & Grypdonck, 2008), and that parent distress is associated with overall family functioning in this population (Pai et al., 2007), the impact of targeted intervention and policy to assist vulnerable mothers could conceivably have far-reaching effects on psychological well-being among all family members.

Strengths of the Current Study

This study is the first of its kind to integrate two previously separate lines of research regarding the etiology and maintenance of psychological distress among families facing high levels of stress. Few studies to date have rigorously examined sociodemographic disadvantage-related effects on psychosocial adjustment in pediatric populations, especially including families of children with cancer. Likewise, previous studies of coping as a moderator of poverty-related stress have primarily been conducted among relatively homogenous and physically healthy

samples. In the present study, the incorporation of interaction models to test moderating effects of coping on both cancer-related stress and sociodemographic disadvantage provides a much needed awareness of the contextual factors surrounding the experience of childhood cancer and also adds an important layer of nuance to our understanding of factors that contribute to risk and resilience for psychological distress under conditions of heightened stress.

With its focus on three-way and multiple two-way moderation effects, this study tackled complex interaction analyses that are necessary for the field's overall understanding of mental health disorders but often avoided in clinical research (Kraemer, 2015). Additionally, the current study used a more complex and methodologically rigorous approach to sociodemographic disadvantage than most prior pediatric psychology studies. Leaders in the field who study effects of poverty on mental and physical health have paid increasing attention to the impact of accumulating stressors on both physiological and psychological processes, highlighting that multiple sociodemographic risk factors exceed the influence of any singular risk factor in affecting adjustment (e.g., Brody et al., 2013; Chen & Miller, 2013; Doan, et al., 2012; Evans & Kim, 2013; Evans et al., 2013; Taylor et al., 2011). However, despite being common and a generally recommended methodological approach (Evans & Kim, 2013), the use of a cumulative risk type variable to assess sociodemographic-related risk has only been used in one previous study of families of children with cancer (Bemis et al., 2015). It is necessary to recognize that sociodemographic factors contribute in critical ways to the experience of chronic illness and should not simply be viewed as “nuisance” variables to control for (e.g., Brown et al., 2008). The current study helps to address this serious problem of quality conceptualization, measurement, and reporting of sociodemographic effects within the pediatric psychology literature.

Several key strengths of the study sample and design are also important to the contribution of the current study to the literature. First, the sample was relatively large and was recruited close in time to the child's cancer diagnosis or relapse. Second, the sample contained a wide range and was relatively heterogeneous with respect to mothers' annual family income levels and educational attainment; the percentage of single mothers in the sample (26.3%) is representative of pediatric psychology studies (Brown et al., 2008). Third, the study design was driven by a control-based model of coping with strong empirical support in both the broader literature as well as with parents of children with cancer (Connor-Smith et al., 2000; Compas et al., 2015) and employed well-validated measures on all key study variables. Finally, the study employed both a cross-sectional and longitudinal approach, allowing for a more comprehensive understanding regarding direction of effects and how the relationships between the study variables play out in the initial weeks and months following a child's cancer diagnosis, one year later, and from diagnosis to one year.

Limitations of the Current Study and Future Directions

Limitations of the current study provide valuable insight and direction for future research. Though the current study is the first to highlight the effects of sociodemographic disadvantage on mothers of children with cancer within a longitudinal design, the use of only two time points may have prohibited the illumination of potentially even more complex relationships between sociodemographic disadvantage and depressive symptoms over time. Specifically, future research should study these constructs at three or more time points in order to detect potential mediational effects. It is notable that sociodemographic disadvantage was related to both depressive symptoms and secondary control coping across time in bivariate relationships, but

was not a significant predictor of depressive symptoms when entered into a regression model with T1 secondary control coping. This is suggestive of a possible mediation effect in which secondary control may mediate, rather than moderate, the relationship between sociodemographic disadvantage and mothers' depressive symptoms over time in this population. Indeed, previous research has supported the role of coping as a mediator in studies of stress and adjustment among low-income populations (e.g., Wadsworth & Compas, 2002) and one pediatric psychology study has found evidence for a mediating role of secondary control coping in the relationship between illness-related stress to anxiety and depressive symptoms among mothers of children with diabetes (Jaser, Linksy, & Grey, 2014). Though the current study was unable to test a rigorous mediation model, which requires assessment at three time points, this will be an essential direction for future research.

The present study focused specifically on cancer-related stress, and did not include poverty-related stress as an independent variable. As such, it cannot be determined precisely which stressors may be most pertinent to mothers facing a child's cancer within the context of sociodemographic information; this information will be integral to a complete understanding of the psychosocial experience of this population. To further coalesce research on coping with cancer and coping with sociodemographic disadvantage, future studies could consider testing the predictive utility of each of these measures in a pediatric cancer population; perhaps the development of a new version of the RSQ (Connor-Smith et al., 2000) that includes aspects of both cancer- and sociodemographic-related stressors in a single measure is warranted.

Although the cumulative sociodemographic variable utilized in this study is generally a strength, as it follows the guidelines set forth by leaders in the field on conceptualization and measurement of this construct, it is important to note that this measure is not completely free of

limitations. A review by Evans, Li, and Whipple (2013) posits that because this measure gives each sociodemographic-related variable the same weight, the underlying assumption is that each of the risk factors matters equally; however we do not yet know this to be the case and further research is needed on the relative impact of each component of this variable. Further, dichotomizing variables to create the composite may result in an overly simplified distinction between risk and non-risk. For example, in the present study, the distinction between a mother's annual family income at the upper end of the \leq \$25,000 bracket versus the lowest end of the \$25,000 – \$50,000 bracket is likely arbitrary and minimal. In addition, it is notable that despite the overall heterogeneity of the current sample on each demographic factor, the standards for the cumulative sociodemographic variable employed were stringent and thus the distribution was largely skewed towards 0, indicating a relatively low-risk sample. The very high stability of mothers' sociodemographic score from T1 to T2 in the present sample illuminates another potential limitation of this technique, as the measure is likely not highly sensitive to potential change over time. In future studies it will be essential to consider how the financial burden of childhood cancer treatment may impact a family's actual or perceived economic position over time (e.g., Bona et al., 2014).

It is also important to note that for the purposes of the present study, race was not included in the conceptualization of sociodemographic disadvantage. The rationale for this was that non-white race has not typically been included in studies using a cumulative risk measure of sociodemographic disadvantage (Brody et al., 2013; Doan, et al., 2012; Evans, 2003), and that race demonstrated few significant associations with psychological adjustment in a recent examination of these constructs among mothers of children with cancer (Bemis et al., 2015). However, each of these studies is similar to the current study in that the samples were largely

white. A substantial body of literature documents racial inequalities in stress exposure and risk for psychological distress (Hudson et al., 2013), economic strain (U.S. Census Bureau, 2012), and cancer survival rates (Ward et al., 2014). Inclusion of racially diverse samples in psychological research and consideration of racial and cultural influences on pediatric cancer (Gray et al., 2014) will be essential to the development of increased understanding and adequate clinical care for all families.

Finally, further research is needed regarding the potential utility of primary control coping among parents facing a child's cancer in the context of sociodemographic disadvantage. Though previous studies have produced mixed results regarding the effects of primary control coping on internalizing symptoms among parents facing poverty-related stress (e.g., Wadsworth et al., 2011), these strategies have been linked to reduced distress among parents of children with cancer near the time of diagnosis (Compas et al., 2015). Thus, though current research does not provide clear direction for hypotheses when integrating these two literatures, exploratory analyses may be warranted in order to assess whether primary control coping skills could be an additional source of resilience for families concurrently coping with sociodemographic disadvantage and cancer-related stress.

Conclusion

The present study improves our understanding of both contextual and personal risk factors for distress among mothers of children with cancer, and provides valuable direction for future research, intervention, and policy. The results support the notion that factors related to sociodemographic disadvantage can no longer be overlooked in the pediatric psychology literature; it is time we account for their fundamental role in the psychosocial sequelae of

childhood cancer and incorporate this knowledge into psychological science and practice. Fortuitously, the current study also illuminates secondary control coping as a source of significant resilience among mothers coping with a child's cancer within the context of sociodemographic disadvantage. This knowledge provides clear direction for next steps in developing successful programs to assist these families. It will be important to bear these developments in mind as we work as a field to further appreciate the impact of social and health care disparities, mobilize change, and provide the most empathic and effective care possible to families facing even the most extreme levels of stress.

Table 1.
Demographic Characteristics of the Sample

	<i>(N = 209)</i>	
	<i>M</i>	<i>SD</i>
Age	37.9	7.0
Years of Education	14.2	2.4
	<i>N</i>	<i>%^a</i>
Race		
White	179	85.6
African-American	16	7.7
Asian American	3	1.4
Other	11	5.3
Relationship Status		
Married/Living with someone	154	74.7
Single, divorced, separated, or widowed	55	26.3
Annual Family Income		
≤ \$25,000	51	24.4
\$25,001 – \$50,000	64	30.6
\$50,001 – \$75,000	35	16.7
\$75,001 – \$100,000	27	12.9
≥ \$100,001	31	14.8
Sociodemographic Disadvantage Score ^b		
0	102	48.8
1	58	27.8
2	29	13.9
3	19	9.1

^a Percentages for annual family income and sociodemographic disadvantage score add up to 99.5% because one participant (0.5%) chose not to report her annual family income.

^b Sociodemographic Disadvantage Score is a composite measure including education, relationship status, and annual family income; higher scores reflect greater levels of sociodemographic disadvantage (see Method section for further details).

Table 2.
Correlations, Means, and Standard Deviations

Measure	1.	2.	3.	4.	5.	6.	7.
1. SDD	--						
2. T1 Stress	.17*	--					
3. T1 SCC	-.19**	-.55***	--				
4. T1 BDI-II	.24**	.56***	-.64***	--			
5. T2 Stress	.13	.39***	-.40***	.38***	--		
6. T2 SCC	-.20**	-.44***	.67***	-.47***	-.50***	--	
7. T2 BDI-II	.22**	.37***	-.50***	.66***	.52***	-.52**	--
Means		28.71	.27	14.37	23.49	.28	11.93
SD		6.81	.06	10.33	7.28	.05	10.39

Note. SDD = sociodemographic disadvantage score; Stress = RSQ cancer-related stress; SCC = secondary control coping; BDI-II = Beck Depression Inventory-II; T1 = Time 1; T2 = Time 2. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 3.

Model 1: Cross-Sectional Regression Analyses Predicting Mothers' Depressive Symptoms at Time 1

Predictor	B	SE (B)	β	p	F	df	p	Adj. R²
Overall Model					29.80	7, 195	<.001	.50
Constant	13.75	.59	--	<.001				
SDD	.16	.65	.02	.80				
T1 Stress	.39	.09	.26	<.001				
T1 SCC	-93.45	11.45	-.50	<.001				
T1 SDD x Stress	.13	.10	.08	.20				
T1 SDD x SCC	-3.17	10.88	-.02	.77				
T1 Stress x SCC	-3.40	1.39	-.13	.02				
T1 SDD x Stress x SCC	-3.59	1.68	-.14	.03				

Note. SDD = sociodemographic disadvantage score; Stress = RSQ cancer-related stress; SCC = secondary control coping; BDI-II = Beck Depression Inventory-II; T1 = Time 1

Table 4.

Model 2: Cross-Sectional Regression Analyses Predicting Mothers' Depressive Symptoms at Time 2

Predictor	B	SE (B)	β	p	F	df	p	Adj. R²
Overall Model					18.96	7, 182	<.001	.42
Constant	11.32	.70	--	<.001				
SDD	.71	.72	.07	.32				
T2 Stress	.62	.12	.43	<.001				
T2 SCC	-38.08	17.76	-.19	.03				
T2 SDD x Stress	-.21	.11	-.20	.05				
T2 SDD x SCC	-42.88	13.84	-.28	<.01				
T2 Stress x SCC	-3.65	1.56	-.14	.02				
T1 SDD x Stress x SCC	-1.53	1.63	-.07	.35				
Overall Model					21.98	6, 183	<.001	.40
Constant	11.39	.69	--	<.001				
SDD	1.05	.62	.10	.09				
T2 Stress	.61	.14	.42	<.001				
T2 SCC	-38.51	17.74	-.19	.03				
T2 SDD x Stress	-.18	.10	-.17	.07				
T2 SDD x SCC	-39.50	13.36	-.26	<.01				
T2 Stress x SCC	-3.39	1.54	-.13	.03				

Note. SDD = sociodemographic disadvantage score; Stress = RSQ cancer-related stress; SCC = secondary control coping; BDI-II = Beck Depression Inventory-II; T2 = Time 2

Table 5.

Model 3: Longitudinal Regression Analyses Predicting Mothers' Depressive Symptoms at Time 2, Controlling for Time 1 Depressive Symptoms

Predictor	B	SE (B)	β	p	F	df	p	Adj. R²
Overall Model					27.46	8, 179	<.001	.55
Constant	5.15	1.01	--	<.001				
T1 BDI-II	.44	.06	.46	<.001				
SDD	.95	.67	.10	.16				
T2 Stress	.32	.09	.24	<.001				
T2 SCC	-34.20	12.41	-.18	<.01				
T2 SDD x Stress	-.06	.10	-.04	.55				
T2 SDD x SCC	-18.29	11.54	-.10	.12				
T2 Stress x SCC	-2.84	1.28	-.12	.03				
T2 SDD x Stress x SCC	-.01	.01	-.10	.19				
Overall Model					31.01	7, 180	<.001	.55
Constant	5.13	1.01	--	<.001				
T1 BDI-II	.43	.06	.45	<.001				
SDD	.41	.53	.04	.44				
T2 Stress	.30	.08	.22	<.001				
T2 SCC	-37.72	12.15	-.20	<.01				
T2 SDD x Stress	-.11	.09	-.08	.19				
T2 SDD x SCC	-22.56	11.10	-.12	.04				
T2 Stress x SCC	-3.10	1.27	-.13	.02				

Note. SDD = sociodemographic disadvantage score; Stress = RSQ cancer-related stress; SCC = secondary control coping; BDI-II = Beck Depression Inventory-II; T1 = Time 1; T2 = Time 2.

Table 6.

Model 4: Longitudinal Regression Analyses Predicting Mothers' Depressive Symptoms at Time 2 from Time 1 Variables

Predictor	B	SE (B)	β	p	F	df	p	Adj. R²
Overall Model					19.32	8, 189	<.001	.43
Constant	3.80	1.25	--	<.01				
T1 BDI-II	.56	.08	.57	<.001				
SDD	.94	.71	.09	.19				
T1 Stress	-.03	.11	-.02	.81				
T1 SCC	-26.20	14.36	-.14	.07				
T1 SDD x Stress	-.02	.11	-.01	.88				
T1 SDD x SCC	-1.88	11.75	-.01	.87				
T1 Stress x SCC	-.69	1.52	-.03	.65				
T1 SDD x Stress x SCC	1.76	1.83	.07	.34				
Overall Model					21.96	7, 190	<.001	.43
Constant	3.91	1.24	--	<.01				
T1 BDI-II	.56	.08	.56	<.001				
SDD	.56	.59	.05	.34				
T1 Stress	-.05	.10	-.03	.65				
T1 SCC	-28.56	14.14	-.15	.04				
T1 SDD x Stress	-.02	.11	-.01	.84				
T1 SDD x SCC	-4.65	11.39	-.03	.68				
T1 Stress x SCC	-.80	1.52	-.03	.60				
Overall Model					38.84	4, 193	<.001	.43
Constant	4.00	1.22	--	<.01				
T1 BDI-II	.57	.07	.57	<.001				
SDD	.58	.59	.05	.33				
T1 Stress	-.06	.10	-.04	.58				
T1 SCC	-27.62	13.56	-.15	.04				

Note. SDD = sociodemographic disadvantage score; Stress = RSQ cancer-related stress; SCC = secondary control coping; BDI-II = Beck Depression Inventory-II; T1 = Time 1; T2 = Time 2

Figure 1.
Proposed Models of Sociodemographic Disadvantage, Cancer-related Stress, and Coping Predicting Mothers' Depressive Symptoms at Each Time Point

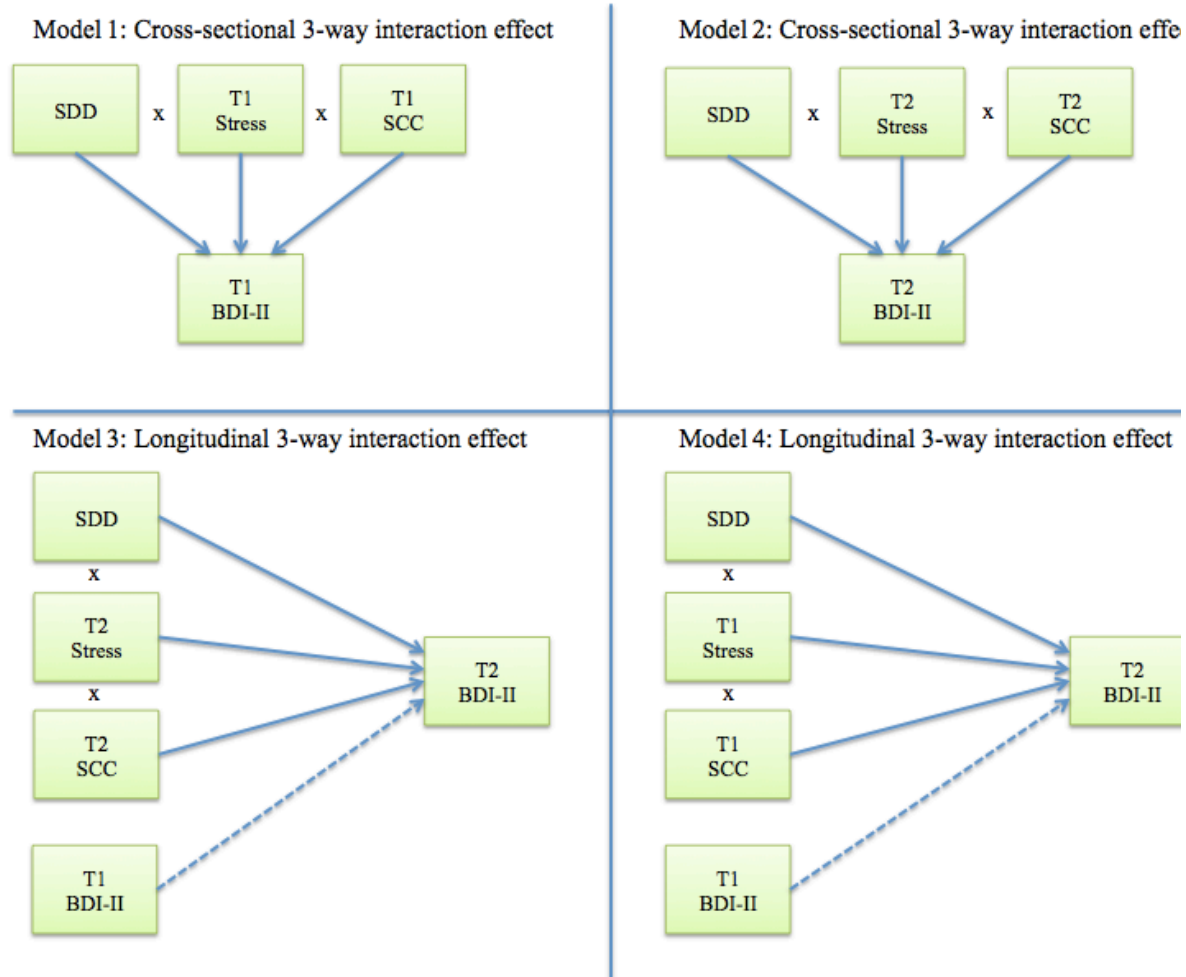


Figure 2.
Three-way Interaction of Sociodemographic Disadvantage, Cancer-related Stress, and Coping predicting Mothers' Depressive Symptoms at Time 1

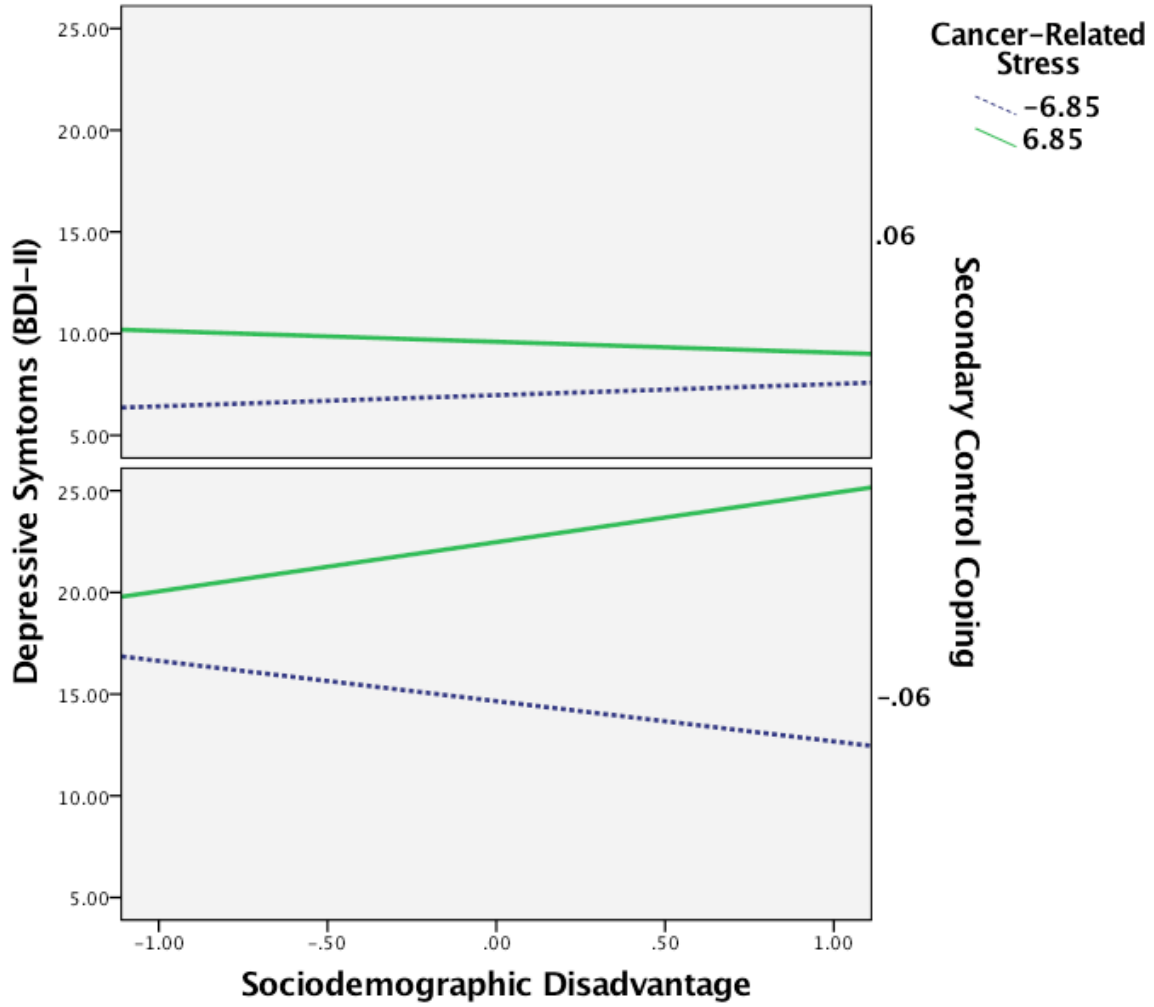


Figure 3.
Two-way Interaction of Sociodemographic Disadvantage and T2 Coping Predicting T2 Depressive Symptoms

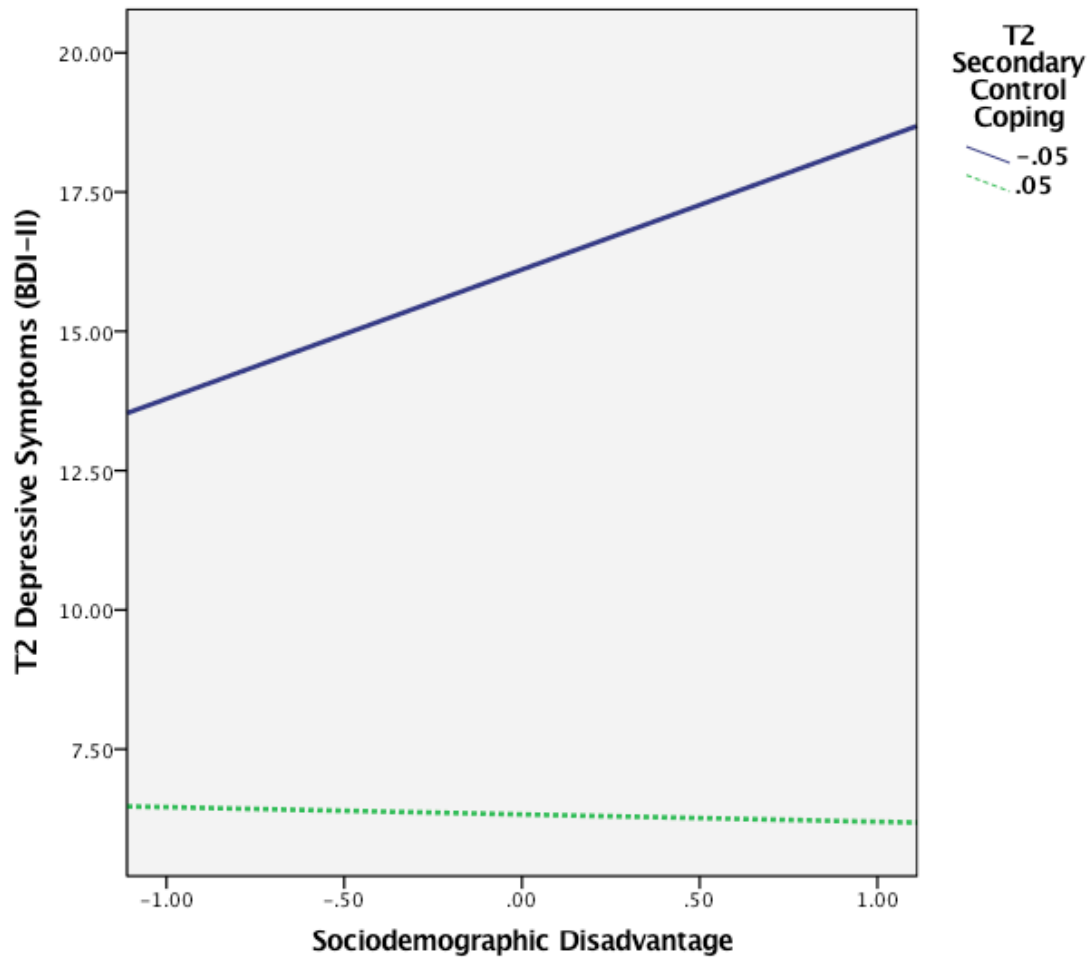


Figure 4.
Two-way Interaction of T2 Cancer-related Stress and T2 Coping Predicting T2 Depressive Symptoms

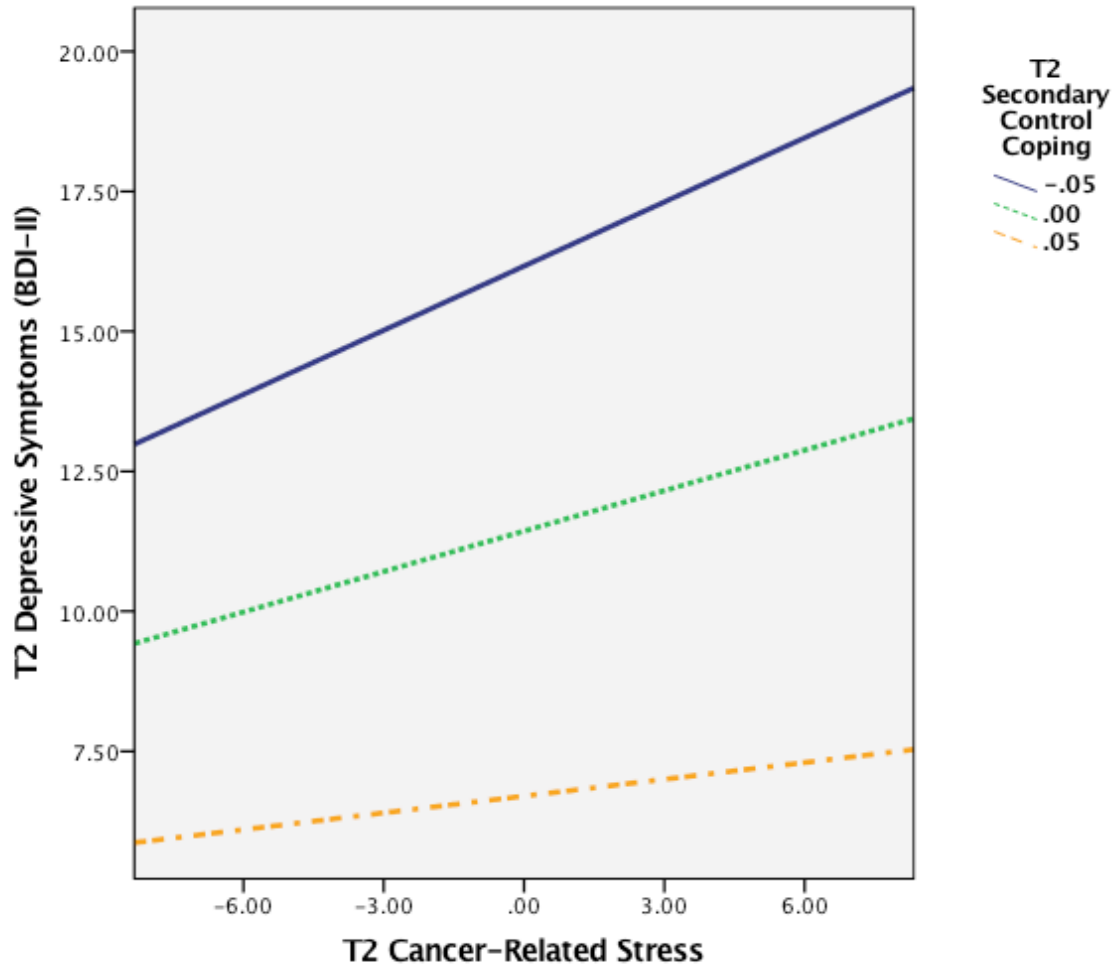


Figure 5.
Two-way Interaction of Sociodemographic Disadvantage and T2 Coping Predicting T2 Depressive Symptoms, Controlling for T1 Depressive Symptoms

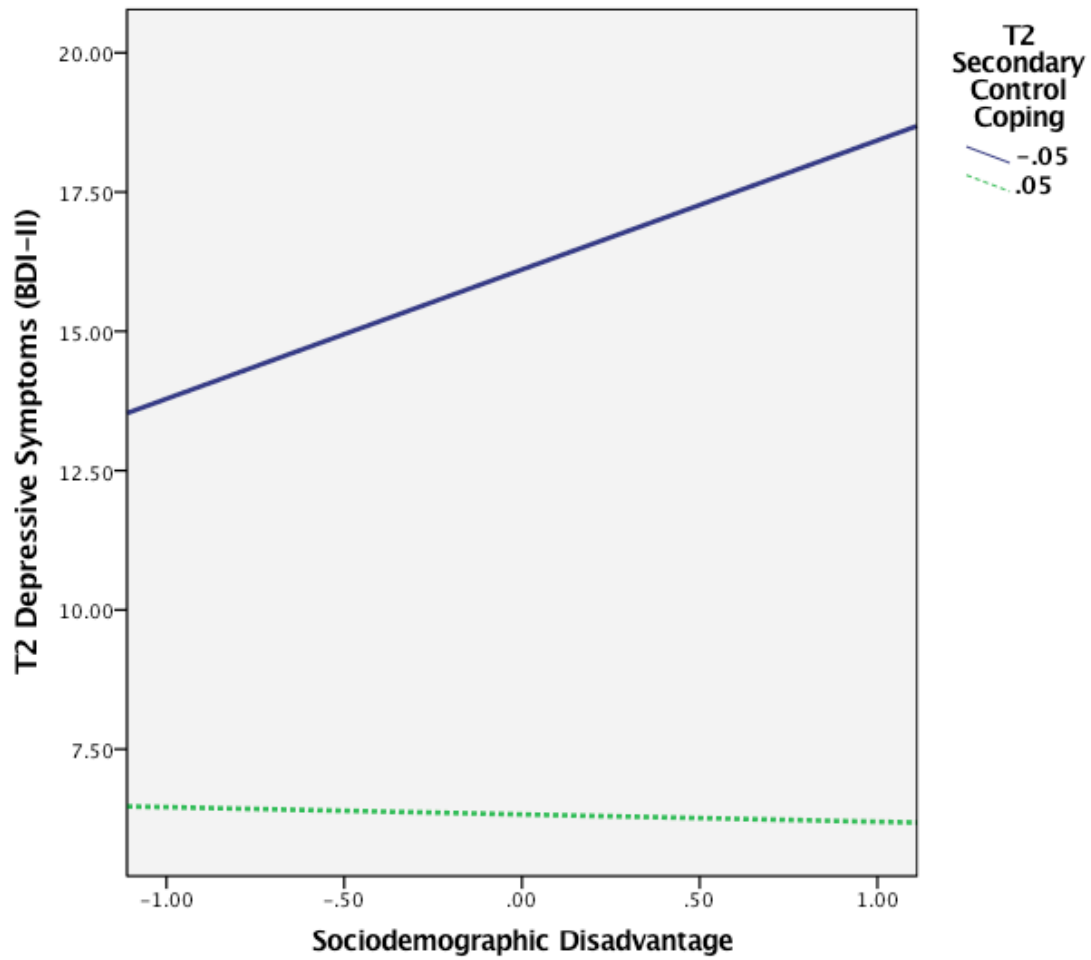
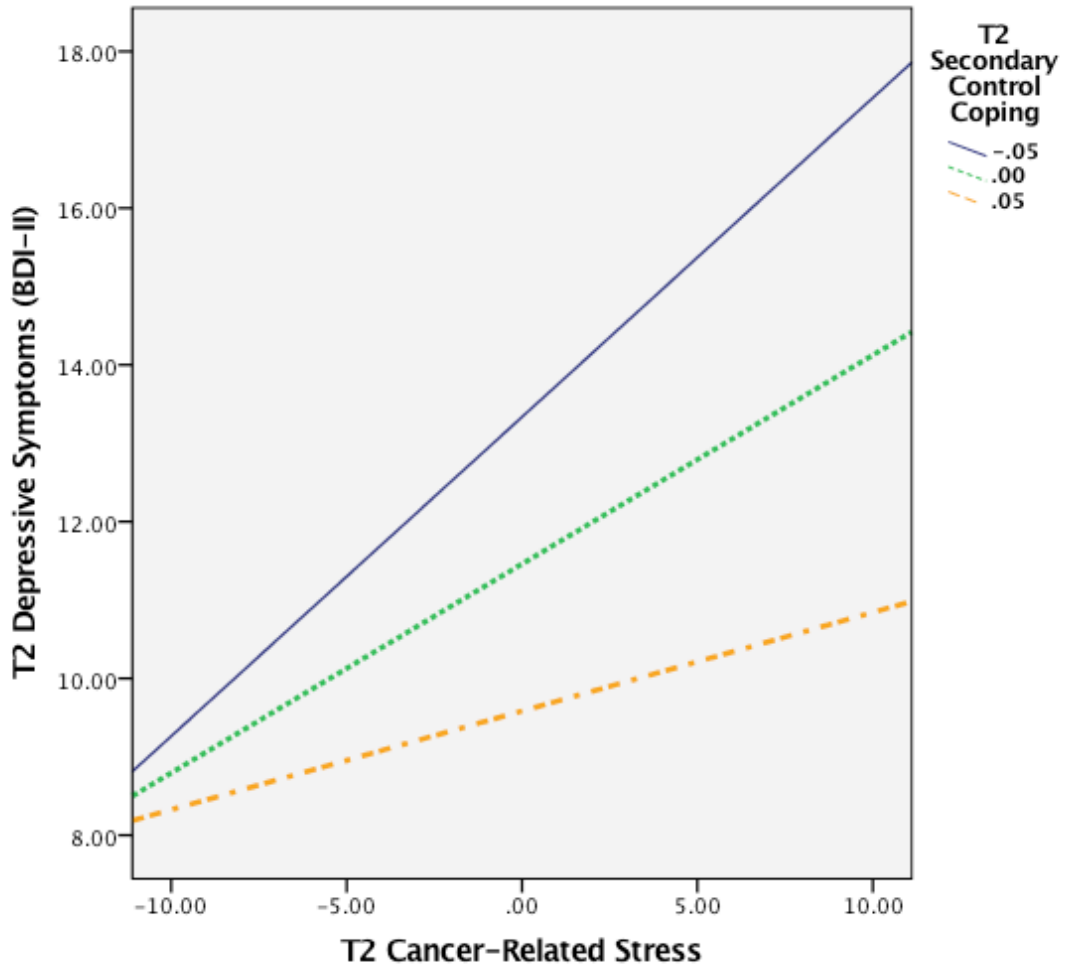


Figure 6.
Two-way Interaction of T2 Cancer-related Stress and T2 Coping Predicting T2 Depressive Symptoms, Controlling for T1 Depressive Symptoms



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