

Social Adjustment and Coping in Children Diagnosed with Cancer:
From Diagnosis to 12 Months

By
Leandra Desjardins

Dissertation

Submitted to the Faculty of the
Graduate School of Vanderbilt University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

in

Psychology

December 16, 2017

Nashville, Tennessee

Approved:

Bruce E. Compas, Ph.D.

David A. Cole, Ph.D.

Sarah S. Jaser, Ph.D.

Megan M. Saylor, Ph.D.

ACKNOWLEDGMENTS

This work would not have been possible without the financial support of the National Cancer Institute (R01CA118332), a gift from Patricia and Rodes Hart, and intramural funding from The Research Institute at Nationwide Children's Hospital. I also gratefully acknowledge the doctoral level funding I received from the Fonds de recherche du Québec – Santé (FRQS).

This study is a product of several years of incredibly enriching learning experiences under the mentorship of Dr. Bruce Compas. I am also grateful for the time commitment and feedback provided by the members of my dissertation committee; Dr. Megan Saylor, Dr. Sarah Jaser, and Dr. David Cole. I would also like to acknowledge the graduate and undergraduate members of the Coping and Communication team, especially Heather Bemis.

To my family, thank you for always encouraging me to pursue my dreams, wherever they may lead me. Thank you to the many friends, near and far, who have been part of this journey with me. I am grateful for your love and support.

Finally, I am indebted to the families who shared their time to participate in this study in hopes of furthering our understanding of coping and adjustment and to help future families of children diagnosed with cancer.

TABLE OF CONTENTS

	Page
ACKNOWLEDGMENTS	ii
LIST OF TABLES.....	iv
Chapter	
I. INTRODUCTION	1
Pediatric Cancer and Social Competence.....	2
Defining Social Competence.....	2
Social Adjustment in Children Diagnosed with Cancer.....	4
Coping.....	9
Theoretical Models of Social Adjustment and Coping.....	12
Empirical Studies of Social Adjustment and Coping.....	14
Goals and Hypotheses.....	19
II. METHODS	21
Participants	21
Procedure	22
Measures	22
Statistical Analyses.....	24
III. RESULTS.....	28
Preliminary Analyses.....	28
Hypothesis 1a: Effects of Secondary Control Coping on Social Problems at T1.....	29
Hypothesis 1b: Effects of Secondary Control Coping on Social Problems at T2.....	29
Hypothesis 2: Effects of Secondary Control Coping on Social Problems at T2, Controlling for T1 Social Problems.....	30
Hypothesis 3: Effects of Secondary Control Coping at T1 on Social Problems at T2, Controlling for T1 Social Problems.....	30
Hypothesis 4a: Effects of Social Problems on Secondary Control Coping at T1.....	30
Hypothesis 4b: Effects of Social Problems on Secondary Control Coping at T2.....	31
Hypothesis 5: Effects of Social Problems on Secondary Control Coping at T2, Controlling for T1 Secondary Control Coping.....	31
Hypothesis 6: Effects of Social Problems at T1 on Secondary Control Coping at T2, Controlling for T1 Secondary Control Coping.....	32
IV. DISCUSSION.....	33
Secondary Control Coping as a Predictor of Child Social Problems.....	34
Child Social Problems as a Predictor of Secondary Control Coping.....	38
Summary.....	40
Strengths and Limitations.....	42
Directions for Future Research.....	43
Conclusion.....	48
REFERENCES.....	49

LIST OF TABLES

Table	Page
1. Descriptive Statistics: Social Problems, Secondary Control Coping, Medical and Demographic Variables.....	64
2. Preliminary Analyses: Correlations Between Demographic and Medical Variables with Secondary Control Coping and Social Problems.....	65
3. Effects of Secondary Control Coping on Social Problems at T1.....	66
4. Effects of Secondary Control Coping on Social Problems at T2.....	67
5. Effects of Secondary Control Coping on Social Problems at T2, Controlling for T1 Social Problems.....	68
6. Effects of Secondary Control Coping at T1 on Social Problems at T2, Controlling for T1 Social Problems.....	69
7. Effects of Social Problems on Secondary Control Coping at T1.....	70
8. Effects of Social Problems on Secondary Control Coping at T2.....	71
9. Effects of Social Problems on Secondary Control Coping at T2, Controlling for T1 Secondary Control Coping.....	72
10. Effects of Social Problems at T1 on Secondary Control Coping at T2, Controlling for T1 Secondary Control Coping.....	73

CHAPTER 1

INTRODUCTION

It is estimated that approximately 13,000 children were diagnosed with cancer in the United States in 2014 (Ward, DeSantis, Robbins, Kohler, & Jemal, 2014). Progress in medical treatment of pediatric cancer has led to a significant decrease in mortality rate, with 5-year survival rates increasing dramatically from 58% in 1975-1977 to above 80% in 2003-2009 (Howlader et al., 2013). Notably, an increasing incidence rate of pediatric cancer in the United States (Ward et al., 2014) and decreasing mortality rate (Howlader et al., 2013) has led to a rise in the number of pediatric cancer survivors. Currently, there are approximately 400,000 survivors of pediatric cancer in the United States (Ward et al., 2014). Given that an increasingly large population of children diagnosed with cancer will likely transition into survivorship, examining factors related to the quality of life of pediatric cancer survivors is a matter of great importance.

The focus of the present study is on the relationship between children's secondary control coping and social adjustment near a diagnosis of pediatric cancer and one year later, as well as across these two time points. First, I review the literature on social competence and coping, as well as models and research findings on the intersection of these constructs. Within the broader domains of social competence and coping, social adjustment and secondary control coping are emphasized as specific constructs that have important implications for children diagnosed with cancer. I then present the rationale and hypotheses for the current study, the methods and data analytic strategy, followed by the results. Finally, the findings are interpreted

and discussed within the context of the current literature, and implications for future research as well as intervention development are also considered.

Pediatric Cancer and Social Competence

Early investigations (e.g., Koocher, O'Malley, Gogan, & Foster, 1980) indicated that some children diagnosed with cancer experience difficulties in psychosocial adjustment during survivorship. Over the past several decades, a growing body of research has highlighted clear areas in which children diagnosed with cancer appear to be particularly impaired. Specifically, the results of several meta-analyses and reviews have highlighted problems in social competence as an important aspect of the psychosocial sequelae of pediatric cancer (e.g., Hocking et al., 2015; Martinez, Carter, & Legato, 2011; Piquart & Shen, 2011; Piquart & Teubert, 2011).

Investigation of social competence in children diagnosed with cancer warrants particular attention, given its important role in overall social development. Difficulties in social competence are associated with both immediate and long-term impairments in other areas of functioning. If social competence is diminished, children are at risk of developing both internalizing problems such as depression and externalizing behavioral problems such as oppositional defiant disorder (e.g., Morison & Masten, 1991; Schulte & Barrera, 2010). In addition, the adequate development of social competence is essential for later successful academic and vocational performance (French & Conrad, 2001; Gest et al., 2006). Given the impact of social competence on social development and other areas of functioning, a clear understanding of the impairments in social competence experienced by children diagnosed with cancer is needed.

Defining Social Competence

In order to organize and synthesize the large body of research on social competence in

children diagnosed with cancer, research on social competence needs to be guided by current conceptualizations of this construct. Several different terms have been offered related to children's social competence (Beauchamp & Anderson, 2010), which may obscure the aggregation of findings across studies and the building of a comprehensive body of knowledge. Overall, there is general consensus that social competence encompasses cognitions, behaviors, and adjustment related to one's interpersonal relationships (e.g., Beauchamp & Anderson, 2010; Hocking et al., 2015; Yeates et al., 2007). Models of social competence have been helpful in providing clear frameworks for understanding facets of social competence and integrating findings across studies.

Early work by Cavell (1990) was useful in synthesizing various definitions and models in order to offer a general framework of social child competence. In Cavell's (1990) model, social competence is regarded as a multi-level construct consisting of three interrelated components. The first component is social skills, which are the personal skills that are required for a child to function successfully in social situations. Social skills are comprised of social information processing, overt behaviors, as well as social cognitive and emotion regulation skills. The second component is social performance, which is the efficiency of interaction between children and their social world. A situational analysis, which assesses typical performance in relevant situations and conformity to socially valid criteria, is central to the assessment of social performance as defined by Cavell (1990). Finally, the third factor, social adjustment, refers to the extent to which a child achieves developmentally appropriate goals. Measures of social adjustment included assessments of social functioning (e.g., peer status), emotional functioning (e.g., self-concept, others' global judgments), family functioning (e.g., composition, degree of cohesion), and relational functioning (e.g., quality of friendships, dating frequency).

Drawing on Cavell's model (1990), Yeates et al. (2007) developed a model for understanding social competence in children with brain disorders that is relevant to understanding social competence in children with cancer. The model specifies three components of social competence: social information processing (SIP), social interaction, and social adjustment. SIP consists of individual characteristics and social skills that impact social behavior and includes three sublevel components: social problem-solving, social-affective functions, and cognitive-executive functions. Social problem-solving reflects reasoning in social situations and includes interpreting cues, identifying goals and generating, selecting, and implementing responses to the situation. Social-affective functioning includes emotion regulation, pragmatic language, and appreciation of self and others' mental states. Cognitive-executive functions include constructs such as attention, cognitive shifting, and inhibition. Social interaction is characterized as actions that bring individuals together (e.g., sociable and prosocial behaviors), actions that move people against each other (e.g., aggression), and actions that isolate individuals from each other (e.g., social withdrawal). Finally, social adjustment refers to others' perceptions and self-perceptions of the quality of a child's social relationships and how well they attain socially desirable and developmentally appropriate goals.

Social Adjustment in Children Diagnosed with Cancer

Social adjustment is the domain of social competence that has received the most empirical attention in studies of children diagnosed with cancer (e.g., Hocking et al., 2015; Martinez et al., 2011; Piquart & Shen, 2011; Piquart & Teubert, 2011). As previously mentioned, the social adjustment facet of social competence assesses the extent to which children attain socially desirable and developmentally appropriate goals. Notably, a subset of children diagnosed with cancer appears to be impaired across many aspects of typical social development.

Parents of cancer survivors were more likely to rate their child as having few or no close friends relative to healthy controls (Barrera Shaw, Speechley, Maunsell & Pogany, 2005). Pediatric cancer survivors have also been found to be older at age of first boyfriend/girlfriend compared to an age and sex matched control group (Stam, Grootenhuis, & Last, 2005). Similarly, dating history was found to be impaired relative to population norms in a large cohort of 10-year survivors of childhood medulloblastoma (Maddrey et al., 2005).

The Childhood Cancer Survivor Study (CCSS) cohort, one of the largest samples of pediatric cancer survivors to be studied ($N = 14,363$; Ellenberg et al., 2009), offers the opportunity to examine the long-term social adjustment of children diagnosed with cancer. A review of previous publications from the CCSS and other relevant research indicated that pediatric cancer survivors were less likely to be married as young adults than a sibling comparison group or matched United States census data (Gurney et al., 2009). Similarly, results from the British Childhood Cancer Survivor Study (BCSSS), which included 9,954 survivors, similarly found that fewer survivors across all age groups reported a history of ever being married relative to population-based statistics (Frobisher, Lancashire, Winter, Jenkinson, & Hawkins, 2007).

Across measures of social adjustment, children diagnosed with cancer experience small to moderate levels of impairment ($d = -.30$; Martinez, Carter, & Legato, 2011). Notably, children diagnosed with cancer are particularly impaired on the Social Problems scale of the Achenbach System of Empirically Based Assessment (ASEBA; Achenbach & Rescorla, 2001) measures. The Social Problems scale reflects immature social behaviors as well as difficulties in peer relationships. A recent meta-analysis indicated a moderate level of impairment on the Social Problems scale (Hedge's $g = .58$; Piquart, & Shen, 2011) across studies of children diagnosed

with cancer, highlighting this area of functioning as one of particular concern.

Longitudinal research. There have been a limited number of longitudinal investigations of social competence in children diagnosed with cancer, and these have focused on the domain of social adjustment. Children diagnosed with cancer were found to have significantly lower than normative values on the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001) Social Competence scale at 1–2 years post-diagnosis and this predicted continued low social competence 3–4 years post-diagnosis (Kullgren, Morris, Morris, & Krawiecki, 2003). In a separate longitudinal study of children diagnosed with cancer, children were found to have significantly greater impairments over time on the Social Problems scale according to both parent and teacher report (Mabbott et al., 2005). Given that children diagnosed with cancer appear to be particularly impaired with regards to social problems (Pinquart & Shen, 2011), evidence that this impairment increases over time further highlights this domain of social adjustment as one warranting empirical attention.

Type of cancer diagnosis. Of note, not all studies have found children diagnosed with cancer to be impaired relative to controls in terms of social adjustment. Some studies have shown that children diagnosed with non-CNS malignancies do not experience significant social difficulties, and may indeed demonstrate more positive social adjustment (perceived as more sociable, less aggressive, experiencing greater social acceptance) than their peers (Noll et al., 1999). Other studies have failed to find differences on the Social Competence scale and other measures of friendship and romantic relationships between non-CNS pediatric cancer survivors and healthy controls (e.g., Gerhardt, Vannatta, Valerius, Correll, & Noll, 2007; Hardy, Willard, Watral, & Bonner, 2010). However, survivors in the Gerhardt et al. (2007) study were approximately half a standard deviation below the normative mean on several social adjustment

measures, but were compared to classmates who were also approximately half a standard deviation below the normative mean. Of note, both of these studies included children with non-CNS cancers. A recent study using the same measure as that of Noll et al. (1999) found that children diagnosed with CNS tumors were less likely to be nominated for leadership-popularity roles and more likely to be nominated for sensitive-isolated and victimization roles than classmates (Salley et al., 2014).

Overall, there is evidence that not all children who are diagnosed with cancer experience significant impairments in social adjustment, especially with regards to social problems, and some diagnostic groups may be particularly impaired. Children diagnosed with brain or CNS tumors appear to be particularly impaired with regards to social adjustment. First, a review of 20 studies of social competence in childhood brain tumor survivors indicated that childhood brain tumor survivors experience decreased social adjustment following treatment, and that these deficits worsen with time (Schulte & Barrera, 2010). Second, children diagnosed with brain tumors have greater impairments in social adjustment relative to controls (e.g., Salley et al., 2014). Third, children diagnosed with brain tumors have been found to have greater impairments in social adjustment relative to those diagnosed with other cancers (Macartney, Harrison, Van Den Kerkhof, Stacey, & McCarthy, 2014).

Treatment intensity. Central nervous system treatment has also been associated with greater difficulties in social adjustment in children diagnosed with cancer. Higher scores on an index of CNS treatment intensity have been associated with poorer peer acceptance, fewer friendships, greater social sensitivity/isolation, and diminished leadership-popularity based on peer-report (e.g., Vannatta, Gerhardt, Wells, & Noll, 2007). Cranial radiation has been associated with increased risk for neurocognitive deficits due to compromised white matter integrity

(Mabbott, Noseworthy, Bouffet, Rockel, & Laughlin, 2006), and impairments in neurocognitive functioning have in turn been associated with impairments in social adjustment in children diagnosed with cancer (Willard, Allen, Hardy & Bonner, 2015; Wolfe et al., 2013). Overall, treatment intensity may contribute to impairments in social adjustment in children diagnosed with cancer and warrants consideration in studies of social adjustment in this population.

Age at diagnosis. An additional factor that has been associated with social adjustment in children diagnosed with cancer is age at diagnosis. Older age at diagnosis has been positively associated with greater parent-reported social competence and fewer social problems in a large (N = 220) longitudinal study of pediatric embryonal tumor survivors (Brinkman et al., 2012). Further, younger age at diagnosis has been associated with greater difficulties in social adjustment (e.g., Bonner et al., 2008). However, others have reported conflicting evidence regarding the relationship between age and social adjustment (see Schulte & Barrera, 2010).

Family income. There is also evidence that family income is associated with social adjustment in children diagnosed with cancer. In a large study of approximately 3,000 survivors of pediatric cancer, lower annual household income was associated with greater difficulties in social adjustment (Schultz et al., 2007). However, others have failed to find a relationship between income and social adjustment (e.g., Barakat et al., 2003). Notably, the Yeates et al. (2007) model of social competence highlights socioeconomic status as an important factor influencing social adjustment, and greater attention to family factors such as income has been called for in future investigations of social adjustment in children diagnosed with cancer (Hocking et al., 2015).

Coping with cancer. Finally, one factor that may also explain the heterogeneity in social adjustment of children diagnosed with cancer is the way in which children attempt to cope with

the stress of a cancer diagnosis and treatment. Several models posit a relationship between coping and social adjustment, and empirical evidence from typically developing and chronically ill populations support this relationship. A discussion of coping and how it relates to social adjustment follows below.

Coping

Coping has been defined as controlled, volitional efforts to regulate cognitions, emotions, behavior, physiological reactions and the environment in response to stress, and can include either engaging with or disengaging from the stressor (Compas, Connor-Smith, Saltzman, Thomsen & Wadsworth, 2001). This model of coping draws on Weisz and colleagues' (e.g., Band & Weisz, 1990; Han, Weisz, & Weiss, 2001; Rothbaum, Weisz, & Snyder, 1982; Rudolph, Dennig, & Weisz, 1995; Weisz, Rothbaum, & Blackburn, 1984) model of child/adolescent perceived control (i.e., the capacity to cause an intended outcome). Within this model, three types of coping have been distinguished—primary control coping, secondary control coping, and disengagement coping (Compas et al., 2001; Compas Jaser, Dunn, & Rodriguez, 2012; Connor-Smith, Compas, Wadsworth, Thomsen, & Saltzman, 2000). Primary control coping includes strategies intended to directly change the source of stress (e.g., problem solving) or one's emotional reactions to the stressor (e.g., emotional expression and emotional modulation). Secondary control coping encompasses efforts to adapt to stress (e.g., cognitive reappraisal, positive thinking, acceptance). Finally, disengagement coping includes efforts to orient away from the source of stress or one's reactions to it (e.g., avoidance, denial, wishful thinking). Confirmatory factor analyses have supported this three-factor structure that is consistent with this model in culturally diverse samples of children and adolescents coping with a range of different types of stress, including illness related stress (e.g., Benson et al., 2011; Compas et al., 2006;

Connor-Smith et al., 2000; Wadsworth, Reickmann, Benson, & Compas, 2004; Yao et al., 2010).

Coping in children diagnosed with cancer. Children diagnosed with cancer face a multitude of stressors, including stressors associated with daily/role functioning, the physical effects of treatment, and uncertainty about cancer (Rodriguez et al., 2012). The stressful aspects associated with a pediatric cancer diagnosis and treatment highlight the need for a thorough understanding of how these children cope with the significant cancer-related stress they experience. Importantly, coping offers the opportunity to examine a mechanism by which psychosocial adjustment may be influenced within this population.

Although there has been an accumulation of research on coping in children diagnosed with cancer, heterogeneity in conceptualizations of coping and methodological approaches have somewhat impeded a clear understanding of the relationship between coping and adjustment within this population. A meta-analysis of children coping with cancer (Aldridge & Roesch, 2007) was guided by models of coping that distinguish between problem-focused coping (efforts to change the source of stress) and emotion-focused coping (efforts to act on one's emotional response to stress; Lazarus & Folkman, 1984), as well as models that differentiate approach coping (coping responses directed toward a threat) and avoidance coping (coping responses directed away from the source of threat; Roth & Cohen, 1986). Only one of 24 effect sizes (correlations) was statistically significant, reflecting a small positive association between emotion-focused coping and depressive symptoms (Aldridge & Roesch, 2007). Several moderators of this effect were identified, including time since diagnosis (2 to 96 months), study type (descriptive vs. intervention), and type of stressor (general cancer stress vs. specific procedural stress). The findings from this meta-analysis highlight the need for greater clarity in the conceptualization of coping, the use of validated measures of coping, and attention to

methodological issues.

Some progress has been made in identifying empirically validated models of coping (Skinner et al., 2003). Particularly, the control-based model of coping described above has generated promising findings on the association between coping and emotional distress in pediatric populations (e.g., Compas, Jaser, Dunn, & Rodriguez, 2012). Notably, this model has been recently applied to understanding the relationship between coping and emotional adjustment in a large multi-informant study of over 300 children with cancer (Compas et al., 2014). This study examined children's coping and symptoms of anxiety/depression near the time of diagnosis based on mothers' reports, fathers' reports, and self-reports of children ages 9-17 years old (Compas et al., 2014). Within and across informant correlation and regression analyses indicated that the use of secondary control coping was associated with better emotional adjustment in children diagnosed with cancer. This study was notable in that it used a well validated measure of coping grounded in an empirically tested coping hierarchy (Connor-Smith et al., 2000), used multiple informants, and included a large sample. However, this study was limited by the cross-sectional design; all measures of coping and emotional distress were collected near the time of the child's diagnosis.

A small number of studies have investigated the relationship between coping and emotional adjustment in children diagnosed with cancer over time (Maurice-Stam et al., 2009; Phipps, Steel, Hall, & Leigh, 2001; Varni & Katz, 1997). However, these studies were limited in that their conceptualizations of coping were not based on an empirically tested coping hierarchy (Phipps et al., 2001; Varni & Katz, 1997) or coping was not assessed during treatment (Maurice-Stam et al., 2009). For example, coping was assessed via measures of repressive adaptational style (defined as low affective distress and high defensiveness; Phipps et al., 2001) or social

support as a resource for coping (Varni & Katz, 1997). Additionally, studies included limited sample sizes (n = 27 to 49 within each time point; Maurice-Stam et al., 2009; n = 41; Varni & Katz, 1997). Overall, although there has been progress in understanding the relationship between coping and emotional adjustment in children diagnosed with cancer over time, longitudinal investigations of this relationship using an empirically sound measure of coping, beginning near the time of the child's diagnosis, as well as exploring other facets of psychosocial adjustment, remain needed.

In sum, the significant stress associated with the diagnosis and treatment of cancer as well as current evidence of the important effect of secondary control coping on adjustment in children diagnosed with cancer highlights the need for a better understanding of coping within this population. Progress in the conceptualization and measurement of coping has led to promising findings of secondary control coping strategies being associated with less distress in children diagnosed with cancer. However, more research on the role of coping as a mechanism of resilience to the psychosocial sequelae of pediatric cancer is needed. Particularly, longitudinal research using an empirically validated measure of coping is a priority. Finally, further investigation is needed on the relationship between coping and other areas of impaired adjustment within this population. Importantly, secondary control coping may offer a promising avenue for understanding risk and resilience in the social adjustment of children diagnosed with cancer.

Theoretical Models of Social Adjustment and Coping

Previous reviews of coping processes have shown that children who are unable to cope effectively with stressful situations are at higher risk for developing difficulties in adjustment (Compas et al., 2001; Skinner & Zimmer-Gembeck, 2007), including social adjustment (e.g.,

Clarke et al., 2006). It has been noted that “coping processes *draw on and are constrained by* the biological, cognitive, *social* and emotional development of the individual” (italics added for emphasis, Compas et al., 2001, p. 89), highlighting a relationship between coping and social adjustment. Coping and social adjustment may influence each other in various ways. Coping may influence social adjustment, social adjustment may influence coping, or that there may be a reciprocal relationship between the two. A limited number of models have been proposed that posit a specific direction of the relationship between coping and social adjustment. These are explored below.

From coping to social adjustment. Within the social competence model outlined by Yeates et al. (2007), emotion regulation (a facet of coping when enacted in response to a stressor) is indicated as directly impacting social problem-solving. Specifically, difficulties in emotion regulation negatively affect the processing of information as well as decision-making in challenging social situations (Lemerise & Arsenio, 2000). According to the model proposed by Yeates et al. (2007), social-problem solving in turn has an important influence on children’s peer interactions and, ultimately, social adjustment. Thus, impairments in coping processes may affect important social skills that then significantly influence the quality and quantity of children’s peer relationships. Notably, although the primary direction of the relationship outlined in Yeates et al.’s model (2007) is from coping processes to social adjustment, this model includes a feedback loop, in that difficulties in social adjustment are then posited to negatively impact emotion regulation.

From social adjustment to coping. Alternatively, an interpersonal model of coping has been posited in which relational competence influences how one copes with stress (Carpenter & Scott, 1992). Within this model, interpersonal factors were described as contributing to coping in

three primary ways. First, many coping activities are interpersonal behaviors, and therefore social skills and resources are needed to enact these coping activities. Second, social resources and beliefs can influence one's choice of coping activities. For example, if one does not have many friends or does not think others will be receptive to their attempt to involve others in coping strategies, one will not seek them out to do so. Third, interpersonal resources affect the skill with which the selected coping activities are carried out. Overall, difficulties in social adjustment may influence both the selection and implementation of coping strategies, particularly those that are social in nature. In addition, similar to the model proposed by Yeates et al. (2007), although the primary direction of the relationship is from social adjustment to coping (Carpenter & Scott, 1992), the interpersonal model of coping also includes a feedback loop, in that poor use of coping is then posited to negatively impact social adjustment.

In sum, there are several theoretical models of the relationship between coping and social adjustment, with at least two models positing how these constructs may interact. The following section provides an overview of empirical studies that have examined the relationship between coping and social adjustment.

Empirical Studies of Social Adjustment and Coping

Various reviews and meta-analyses have indicated a relationship between coping and emotional and behavioral adjustment (Fields & Prinz, 1997), social and academic competence (Compas et al., 2001), as well as social adjustment more specifically (e.g., Clarke, 2006) in healthy children and adolescents. However, there has been limited empirical attention to the relationship between social adjustment and coping in children with chronic illnesses. Therefore, a broader overview of studies investigating this relationship in healthy children will be provided first.

Social adjustment and coping in healthy children. Across studies assessing the relationship between coping and social adjustment, engagement-related coping strategies appear to be associated with better social adjustment. A meta-analysis of coping with interpersonal stress and adjustment in children and adolescents found a significant small positive association between the use of active coping strategies and social adjustment (Clarke, 2006). Within this meta-analysis, active coping included approach, primary control, and problem-focused coping strategies such as problem-solving, assertive communication, and seeking social support. Engagement coping strategies may allow children to practice adaptive social skills and children's use of overt and covert coping strategies to manage distress may lead them to be perceived as more competent by their peers. Consistent with this, children's use of challenge coping (self-reliance, support seeking, problem solving, information seeking, accommodation, and negotiation), active coping, and support seeking coping strategies in response to interpersonal stress were all positively associated with greater social acceptance by peers (Zimmer-Gembeck, Lees, & Skinner, 2011). Further, children's use of active coping strategies across situations (i.e., dispositional coping) has also been associated with greater social adjustment (Abraham, & Kerns, 2013; Contreras, Kerns, Weimer, Gentzler, & Tomich., 2000; Kliewer & Sandler, 1993).

Supporting the Yeates et al. (2007) model of social competence, a limited number of longitudinal studies have demonstrated that engagement coping strategies predict better child social adjustment over time. In a longitudinal study of children's coping with peer related stress, mastery coping (which involves active efforts to change the situation) was positively associated with better friendship quality three months later (Shin & Ryan, 2011). In a multi-year longitudinal study by Eisenberg et al. (1997), constructive coping strategies (instrumental, support-seeking, and positive cognitive restructuring coping) were related to lower social

problem behavior two years later. Overall, there appears to be significant empirical support of a positive association between social adjustment and engagement coping. However, exceptions to this pattern do exist (Erath & Tu, 2013; Swanson, Valiente, Lemery-Chalfant, & O'Brien, 2011), indicating a need for greater clarification of how coping may be related to social adjustment.

Conversely, there is limited evidence that social adjustment predicts coping in typically developing children. In a series of hierarchical linear regression analyses, after controlling for current depressive symptoms, children's perceived social adjustment predicted greater use of behavioral confrontation, problem-focused, and behavioral distraction coping strategies (Reijntjes, Stegge, & Meerum-Terwogt, 2006). However, this study was cross-sectional, and therefore the direction of the relationship over time could not be discerned. Unfortunately, longitudinal investigations of the influence of social adjustment on coping in children are currently lacking.

Children's use of disengagement coping strategies has also been associated with social adjustment, and particularly problematic social behavior. Notably, the use of disengagement coping strategies does not allow a child to practice social skills, address the source of distress, and demonstrate competent behavior. In a longitudinal study of children's coping with social problems, "nonchalance coping" (which involves "playing it cool" and actively trying to persuade friends that an issue is not a problem) was positively associated with problematic social behavior three months later (Shin & Ryan, 2011). Within the same study, avoidance coping was associated with higher scores on a measure of anxious-solitude three months later (Shin & Ryan, 2011). Finally, children's use of destructive coping strategies (including avoidance) was related to greater social problem behaviors both two and four years later (Eisenberg et al., 1997). Overall, there is evidence that disengagement coping strategies are associated with difficulties in

social adjustment. However, other studies have found no significant association between disengagement coping and child social adjustment (Erath & Tu, 2014), or even that children's use of avoidant coping strategies (cognitive avoidance, avoidant actions) are positively associated with greater social acceptance by peers (Kliewer & Sandler, 1993; Zimmer-Gembeck et al., 2011), indicating the need for further investigation and clarification of this relationship.

In sum, there is evidence from studies of healthy children that active coping strategies are related to better social adjustment. Although models have proposed bidirectional relationships between coping and social adjustment, a limited number of empirical studies have allowed for the examination of this relationship. Currently available longitudinal evidence indicates that coping influences later social adjustment (e.g., Eisenberg et al., 1997; Shin & Ryan, 2011). However, no studies have tested the converse relationship longitudinally. Longitudinal investigations using a measure of coping based on an empirically tested coping hierarchy that distinguishes between engagement strategies (i.e. primary control versus secondary control) may be helpful in understanding the direction and nature of this relationship.

Social adjustment and coping in children with chronic illnesses. Coping has been identified as an important correlate of social adjustment in children with chronic illnesses other than cancer (Meijer, Sinnema, Bijstra, Mellenbergh, & Wolters, 2002). The control-based model of coping described above (Compas et al., 2001, 2012; Connor-Smith et al., 2000) may be particularly promising in understanding the relationship between coping and social adjustment in children with chronic illness. For example, in a study of children and adolescents with diabetes (Jaser & White, 2011), primary and secondary control coping with diabetes related stress was associated with greater social competence, while disengagement coping was associated with lower social competence.

Although certain coping strategies (e.g., seeking information, seeking support and comfort, accepting the situation) have been posited to be associated with better social adjustment in children diagnosed with cancer (Van Dongen-Melman, Pruyn, Van Zanen, & Sanders-Woudstra, 1986), there have been few investigations of this relationship within this population. Findings from a limited number of studies of children diagnosed with cancer have echoed results from studies of typically developing children and children with other chronic illnesses (e.g., Clarke, 2006; Jaser & White, 2011), in that primary and secondary control related coping strategies appear to be positively related to a broad index of adjustment (including social problems), while disengagement related strategies are related to poorer adjustment in children diagnosed with acute lymphocytic leukemia (Campbell et al., 2009) and pediatric retinoblastoma survivors (Van Dijk et al., 2009). In a study of children diagnosed with brain tumors, secondary control coping, but not primary control or disengagement coping, was significantly correlated with fewer social problems (Robinson et al., 2015). A limitation of these studies is that all were cross-sectional and therefore the direction of the relationship between coping and social adjustment could not be discerned. Overall, there is some preliminary evidence that coping, particularly secondary control coping, may be related to social adjustment in children diagnosed with cancer. However, a more thorough investigation of the nature and direction of the relationship between secondary control coping and social adjustment, particularly social problems, in children diagnosed with cancer is needed.

In sum, children diagnosed with cancer are at risk for developing impairments in social adjustment, particularly social problems, and coping may play a key role in risk and resilience in these children. Secondary control coping with cancer related stress is most consistently associated with better adjustment, including social adjustment, in these children. Current

investigation of the relationship between coping and social adjustment in children diagnosed with cancer has been limited by the use of more broad indices of adjustment, with only one study including a specific measure of social adjustment. Further, there have been no longitudinal investigations of the relationship between coping and indices of social adjustment in children diagnosed with cancer. Determining the direction of the relationship over time holds particular promise for the development of effective intervention programs for children diagnosed with cancer.

Goals and Hypotheses

The primary goal of the current study is to examine the nature and the direction of the relationship between social adjustment and coping in children diagnosed with cancer during the first year after diagnosis. Hypotheses 1-3 pertain to analyses examining the influence of secondary control coping on social problems. Hypotheses 4-6 pertain to analyses examining the influence of social problems on children's use of secondary control coping.

Hypothesis 1: Greater use of secondary control coping will be related to lower social problems cross-sectionally within each time point (Time 1 and Time 2), controlling for child age, family income, diagnosis type and intensity of treatment.

Hypothesis 2: Greater use of secondary control coping at Time 2 (approximately one year post diagnosis) will be related to lower social problems at Time 2, controlling for Time 1 (near diagnosis) social problems, child age, family income, diagnosis type and intensity of treatment.

Hypothesis 3: Secondary control coping at Time 1 will be related to lower social problems at Time 2, controlling for Time 1 social problems, child age, family income, diagnosis type and intensity of treatment.

Hypothesis 4: Greater social problems will be related to lower use of secondary control

coping cross-sectionally within each time point (Time 1 and Time 2), controlling for child age, family income, diagnosis type and intensity of treatment.

Hypothesis 5: Fewer social problems at Time 2 will be related to greater use of secondary control coping at Time 2, controlling for Time 1 secondary control coping, child age, family income, diagnosis type and intensity of treatment.

Hypothesis 6: Fewer social problems at Time 1 will be related to greater use of secondary control coping at Time 2, controlling for Time 1 secondary control coping, child age, family income, diagnosis type and intensity of treatment.

CHAPTER II

METHODS

Participants

Three hundred and twenty-five mothers participated in this study. Mothers reported on 325 children with cancer at T1 and 219 of these mothers provided follow-up reports of child coping and social problems at T2. Nineteen children passed away between T1 and T2. Other 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. Mothers who completed both time points did not significantly differ from those who were lost to follow-up with regard to child race, child ethnicity, cancer diagnosis type, mother report of child T1 coping, or mother report of child social problems, p 's $>.10$. However, there was a relation between relapse status and attrition; families of children who had relapsed at T1 (10.5% of the current sample) were less likely to participate at T2 ($X^2 = 8.38, p < .01$).

Mothers provided reports on their children who were on average 10.69 years old ($SD = 3.96$) at diagnosis and 47.7% were female. Races represented in the sample included 84.9% Caucasian, 9.5% African-American, 0.3% Asian, 0.3% American Indian/Native Alaskan, while the remainder reported "Other" for their race; 7.1% of the sample were Hispanic/Latino. Measures were translated into Spanish and two Spanish-speaking parents participated. Cancer diagnoses were grouped by leukemia, lymphoma and other solid tumor (89.2%), versus brain tumor (8.4%) for analyses. Two hundred and ninety families (89.2%) were recruited after initial diagnosis and 35 (10.8%) after a relapse. Mothers were on average aged 37.9 years ($SD = 7.8$)

and had 13.9 years ($SD = 2.32$) of education. Families represented a range of income levels: 26.7% \$25,000 or less; 26.2% \$25,001-50,000; 14.2% \$50,001-75,000; 10.5% \$75,000-100,000; 14.5% \$100,000 or above; 2.5% did not report their income.

Procedure

Data was obtained from a larger study in which children with cancer and their parents were recruited from two pediatric oncology centers in the Midwestern and Southern United States. Eligible families had children who (a) were ages 5–17 years old, (b) had a new cancer diagnosis or recent recurrence, (c) were receiving treatment by an oncologist, and (d) had no premorbid developmental disability.

At T1, on average 2 months after the diagnosis or relapse of the child's cancer ($M = 2.0$; $SD = 1.6$ months; interquartile range = 29-78 days), mothers completed reports on the child's coping and social problems as well as family demographics. At T2, approximately 12 months later ($M = 11.7$; $SD = 2.5$ months; interquartile range = 315-386 days), mothers were asked to complete the same questionnaires. At T2, 51.5% of children were receiving treatment, while 46% were off treatment. Treatment information was not available for 2.6% of children, largely due to lack of access to medical records when a child's treatment was transferred to another center.

Institutional Review Boards at both academic medical centers approved all study procedures. Informed consent and assent to complete all questionnaires was obtained from the parents and children. Families were compensated at each time point.

Measures

Demographic and medical data. Mothers provided demographic information including age and family income. Mothers gave permission for the research staff to access medical data,

including the child's diagnosis type and treatment type. Based on previous research indicating greater difficulties in social adjustment in children diagnosed with brain tumors, diagnosis type was dichotomized as brain tumor versus Leukemia, Lymphoma, and other solid tumor. Treatment intensity was categorized at four levels according to the Intensity of Treatment Rating scale 2.0 (ITR-2; Werba, Hobbie, Kazak, Ittenbach, Reilly, & Meadows, 2007). Treatments were classified as least intensive (e.g., Wilms' tumor- stages I and II), moderately intensive (e.g., Acute Lymphoblastic Leukemia – standard risk), very intensive (e.g., Ewing Sarcoma), or most intensive (e.g., relapse protocols).

Social adjustment. Mothers' reports of their children's social adjustment was assessed via the Child Behavior Checklist (CBCL) Social Problems scale. Reliability and validity are well established for the CBCL. Normative *T* scores are derived from parents' reports on a nationally representative sample of children and youth ages 6-17 years old (Achenbach & Rescorla, 2001). The CBCL offers several advantages: it is well validated, has a large representative normative data set, and allows for multiple informants of the same constructs (Achenbach & Rescorla, 2001).

The Social Problems scale on the CBCL assesses immature social behaviors as well as difficulties in peer relationships via 11 items. Examples of items from this scale include: "clings to adults or too dependent," "gets teased," "not liked," "too dependent," "prefers being with younger children," and "lonely." This scale can be broadly understood as representing difficulties in social adjustment.

Children's coping. The Responses to Stress Questionnaire - Pediatric Cancer version (RSQ-PC; Compas et al., 2014; Connor-Smith et al., 2000; Miller et al., 2009; Rodriguez et al., 2012) was used to obtain mothers' reports of their children's coping with cancer-related

stressors. The RSQ-PC version includes a list of 12 cancer-related stressors including role functioning (e.g., missing school), physical effects of treatment (e.g., changes in personal appearance), and cancer uncertainty (e.g., concerns about the future) and participants rate how stressful each item has been recently on a scale from 1 (Not at all) to 4 (Very). The RSQ-PC contains 57 items reflecting voluntary (coping) and involuntary (automatic) stress responses of children/adolescents to cancer-related stressors. Mothers were asked to rate each item with regard to the degree/frequency with which their child used a specific coping strategy when faced with the cancer-related stressors rated on a 4-point scale (0 = *not at all* to 4 = *a lot*).

The factor structure of the RSQ has been supported in confirmatory factor analytic studies with children and adolescents from a wide range of ethnic and cultural backgrounds coping with a variety of stressors (e.g., Wadsworth et al., 2004; Yao et al., 2010). The coping scales include primary control coping (i.e., problem solving, emotional modulation, emotional expression; 9 items), secondary control coping (i.e., acceptance, cognitive restructuring, positive thinking, distraction; 12 items), and disengagement coping (i.e., avoidance, denial, wishful thinking; 9 items). Based on previous research, only the secondary control coping scale was used for analyses. Using the standard method for scoring the RSQ, and to control for response bias and individual differences in base rates of item endorsement, proportion scores were calculated by dividing the total score for each factor by the total score for the RSQ (Connor-Smith et al., 2000; Osowiecki & Compas, 1999; Vitaliano, Maiuro, Russo, & Becker, 1987).

Statistical Analyses

Preliminary analyses. All analyses were conducted using SPSS (version 23). A series of Pearson bivariate correlations were used to examine the bivariate associations between social problems, secondary control coping and child age, family income, and treatment intensity.

Independent *t*-tests were also used to compare social problems and secondary control coping in children with brain tumors versus those with other cancer diagnoses.

Hypothesis 1a: Effects of Secondary Control Coping on Social Problems at T1. To test the main effects of secondary control coping near diagnosis on social problems near diagnosis, a two step multiple linear regression model was used. In the first step of the model, mother's report of child's use of secondary control coping near diagnosis was entered. In the second step of the model, child age, family income, and diagnosis type were entered (see Table 3).

Hypothesis 1b: Effects of Secondary Control Coping on Social Problems at T2. To test the main effects of secondary control coping on social problems approximately one year post diagnosis, a two-step multiple linear regression model was used. In the first step of the model, mother's report of child's use of secondary control coping approximately one-year post diagnosis was entered. In the second step of the model, child age, family income, diagnosis type, and treatment intensity were entered (see Table 4).

Hypothesis 2: Effects of Secondary Control Coping on Social Problems at T2, Controlling for T1 Social Problems. To test the main effects of secondary control coping on social problems approximately one year post diagnosis, controlling for secondary control coping near diagnosis, a three step multiple linear regression model was used. In the first step of the model, mother's report of child's use of secondary control coping approximately one-year post diagnosis was entered. In the second step of the model, mother's report of child social problems near diagnosis was entered. In the final step, child age, family income, diagnosis type, and treatment intensity were entered (see Table 5).

Hypothesis 3: Effects of Secondary Control Coping at T1 on Social Problems at T2, Controlling for T1 Social Problems. To test the main effects of secondary control coping near

diagnosis on social problems approximately one year post diagnosis, controlling for social problems near diagnosis, a three-step multiple linear regression model was used. In the first step of the model, mother's report of child's use of secondary control coping near diagnosis was entered. In the second step of the model, mother's report of child's use of child social problems near diagnosis was entered. In the final step, child age, family income, diagnosis type, and treatment intensity were entered (see Table 6).

Hypothesis 4a: Effects of Social Problems on Secondary Control Coping at T1. To test the main effects of social problems on secondary control coping near diagnosis, a two step multiple linear regression model was used. In the first step of the model, mother's report of child social problems near diagnosis was entered. In the second step of the model, child age, family income, and diagnosis type were entered (see Table 7).

Hypothesis 4b: Effects of Social Problems on Secondary Control Coping at T2. To test the main effects of social problems on secondary control coping approximately one year post diagnosis, a two-step multiple linear regression model was used. In the first step of the model, mother's report of child social problems approximately one-year post diagnosis was entered. In the second step of the model, child age, family income, diagnosis type, and treatment intensity were entered (see Table 8).

Hypothesis 5: Effects of Social Problems on Secondary Control Coping at T2, Controlling for T1 Secondary Control Coping. To test the main effects of social problems on secondary control coping approximately one year post diagnosis, controlling for child social problems near diagnosis, a three step multiple linear regression model was used. In the first step of the model, mother's report of child social problems approximately one-year post diagnosis was entered. In the second step of the model, mother's report of child's use of secondary control

coping near diagnosis was entered. In the final step, child age, family income, diagnosis type, and treatment intensity were entered (see Table 9).

Hypothesis 6: Effects of Social Problems at T1 on Secondary Control Coping at T2, Controlling for T1 Secondary Control Coping. To test the main effects of social problems near diagnosis on secondary control coping approximately one-year post diagnosis, controlling for child secondary control coping near diagnosis, a three-step multiple linear regression model was used. In the first step of the model, mother's report of child social problems near diagnosis was entered. In the second step of the model, mother's report of child's use of secondary control coping near diagnosis was entered. In the final step, child age, family income, diagnosis type, and treatment intensity were entered (see Table 10).

CHAPTER III

RESULTS

Preliminary Analyses

Descriptive statistics. Means and standard deviations are presented in Table 1 for mother report of children's coping on the RSQ and levels of children's social problems from the CBCL. Means T scores on the Social Problems scale ranged from $M = 53.73$ ($SD = 5.57$) at T1 to $M = 54.42$ ($SD = 6.37$) at T2. These indicated, on average, mild to moderate levels of social problems, with mean T scores ranging from approximately 0.37 to 0.44 standard deviations above the normative mean (i.e., a moderate effect size). The percentage of children with clinically elevated social problems ($T > 70$) scores was 2.5% at T1 and 4.2% at T2 according to mother report. Further, 5.4% of children at T1 and 10.7% of children at T2 obtained T scores at or above the borderline cutoff ($T > 65$) on the social problems scale according to mother report.

Examination of possible covariates. Child age at diagnosis was significantly correlated with T1 social problems ($r = -.16$; $p < .01$), T2 social problems ($r = -.19$; $p < .01$), T1 secondary control coping ($r = .16$; $p < .01$), but not T2 secondary control coping. Annual family income was correlated with T1 social problems ($r = -.25$; $p < .001$) and T2 social problems ($r = -.22$; $p < .01$), but was not significantly correlated with secondary control coping at either time point. Treatment intensity was not correlated with social problems or secondary control coping at either time point. Using t -tests, differences between children diagnosed with brain tumors and children diagnosed with other cancers approached significance for T1 social problems ($t = -1.92$; $p = .06$) and T1 secondary control coping ($t = 1.74$; $p = .08$). No significant differences were found

between children with brain tumors and children with other cancer diagnoses on T2 social problems and T2 secondary control coping.

To control for the possible effects of these variables in the multivariate analyses, child age, family income, and type of cancer diagnosis were all included in the regression analyses. Given the evidence supporting the association between treatment intensity and social adjustment in children diagnosed with cancer (e.g., Vannatta, Gerhardt, Wells & Noll, 2007), treatment intensity was also included in the regression analyses.

Linear Multiple Regression Analyses

Hypothesis 1a: Effects of Secondary Control Coping on Social Problems at T1. For the model predicting mother report of child T1 social problems from mother report of T1 children's use of secondary control coping, the overall equation was significant ($p < .001$, adjusted $R^2 = .10$). In step 1, T1 secondary control coping was a significant predictor of T1 social problems ($\beta = -.20$, $p < .001$). In step 2, T1 secondary control coping ($\beta = -.17$, $p < .01$) continued to be a significant predictor of T1 social problems when controlling for child age ($\beta = -.10$, $p = .09$), family income ($\beta = -.22$, $p < .001$), and diagnosis type (ns , $p > .10$).

Hypothesis 1b: Effects of Secondary Control Coping on Social Problems at T2. For the model predicting mother report of child T2 social problems from mother report of T2 children's use of secondary control coping, the overall equation was significant ($p < .001$, adjusted $R^2 = .09$). In step 1, T2 secondary control coping was a significant predictor of T2 social problems ($\beta = -.21$, $p < .01$). In step 2, T2 secondary control coping ($\beta = -.20$, $p < .01$) continued to be a significant predictor of T2 social problems when controlling for child age ($\beta = -.15$, $p < .05$), family income ($\beta = -.19$, $p < .01$), treatment intensity (ns , $p > .10$), and diagnosis type (ns , $p > .10$).

Hypothesis 2: Effects of Secondary Control Coping on Social Problems at T2,

Controlling for T1 Social Problems. For the model predicting mother report of child T2 social problems from mother report of T2 children's use of secondary control coping, controlling for T1 social problems, the overall equation was significant ($p < .001$, adjusted $R^2 = .45$). In step 1, T2 secondary control coping was a significant predictor of T2 social problems ($\beta = -.22, p < .01$). In step 2, T2 secondary control coping ($\beta = -.11, p < .05$) continued to be a significant predictor of T2 social problems when controlling for T1 social problems ($\beta = .64, p < .001$). In step 3, T2 secondary control coping ($\beta = -.11, p < .05$) remained a significant predictor of T2 social problems when controlling for T1 social problems ($\beta = .62, p < .001$), child age ($\beta = -.13, p < .05$), family income ($ns, p > .10$), treatment intensity ($ns, p > .10$), and diagnosis type ($ns, p > .10$).

Hypothesis 3: Effects of Secondary Control Coping at T1 on Social Problems at T2,

Controlling for T1 Social Problems. For the model predicting mother report of child T2 social problems from mother report of T1 children's use of secondary control coping, controlling for T1 social problems, the overall equation was significant ($p < .001$, adjusted $R^2 = .46$). In step 1, T1 secondary control coping was a significant predictor of T2 social problems ($\beta = -.23, p < .01$). In step 2, T1 secondary control coping ($\beta = -.11, p < .05$) continued to be a significant predictor of T2 social problems when controlling for T1 social problems ($\beta = .64, p < .001$). In step 3, T1 secondary control coping approached significance ($\beta = -.09, p = .09$) in predicting T2 social problems when controlling for T1 social problems ($\beta = .63, p < .001$), child age ($\beta = -.12, p < .05$), family income ($ns, p > .10$), treatment intensity ($ns, p > .10$), and diagnosis type ($ns, p > .10$).

Hypothesis 4a: Effects of Social Problems on Secondary Control Coping at T1. For the

model predicting mother report of children's use of T1 secondary control coping from mother report of child T1 social problems, the overall equation was significant ($p < .01$, adjusted $R^2 = .05$). In step 1, T1 social problems was a significant predictor of T1 secondary control coping ($\beta = -.20$, $p < .001$). In step 2, T1 social problems ($\beta = -.18$, $p < .01$) continued to be a significant predictor of T1 secondary control coping when controlling for child age ($\beta = .13$, $p < .05$), family income (ns , $p > .10$), and diagnosis type (ns , $p > .10$).

Hypothesis 4b: Effects of Social Problems on Secondary Control Coping at T2. For the model predicting mother report of children's use of T2 secondary control coping from mother report of child T2 social problems, the overall equation approached significance ($p = .09$, adjusted $R^2 = .02$). In step 1, T2 social problems was a significant predictor of T2 secondary control coping ($\beta = -.21$, $p < .01$). In step 2, T2 social problems ($\beta = -.21$, $p < .01$) continued to be a significant predictor of T2 secondary control coping when controlling for child age (ns , $p > .10$), family income (ns , $p > .10$), treatment intensity (ns , $p > .10$), and diagnosis type (ns , $p > .10$).

Hypothesis 5: Effects of Social Problems on Secondary Control Coping at T2, Controlling for T1 Secondary Control Coping. For the model predicting mother report of children's use of T2 secondary control coping from mother report of child T2 social problems, controlling for T1 secondary control coping, the overall equation was significant ($p < .001$, adjusted $R^2 = .32$). In step 1, T2 social problems was a significant predictor of T2 secondary control coping ($\beta = -.21$, $p < .01$). In step 2, T2 social problems (ns , $p > .10$) was no longer a significant predictor of T2 secondary control coping when controlling for T1 secondary control coping ($\beta = .55$, $p < .001$). In step 3, T2 social problems remained non significant (ns , $p > .10$) when controlling for T1 secondary control coping ($\beta = .56$, $p < .001$), child age (ns , $p > .10$),

family income (*ns*, $p > .10$), treatment intensity (*ns*, $p > .10$), and diagnosis type (*ns*, $p > .10$).

Hypothesis 6: Effects of Social Problems at T1 on Secondary Control Coping at T2, Controlling for T1 Secondary Control Coping. For the model predicting mother report of children's use of T2 secondary control coping from mother report of child T1 social problems, controlling for T1 secondary control coping, the overall equation was significant ($p < .001$, adjusted $R^2 = .32$). In step 1, T1 social problems was a significant predictor of T2 secondary control coping ($\beta = -.16$, $p < .05$). In step 2, T1 social problems (*ns*, $p > .10$) was no longer a significant predictor of T2 secondary control coping when controlling for T1 secondary control coping ($\beta = .56$, $p < .001$). In step 3, T1 social problems remained non significant (*ns*, $p > .10$) when controlling for T1 secondary control coping ($\beta = .58$, $p < .001$), child age (*ns*, $p > .10$), family income (*ns*, $p > .10$), treatment intensity (*ns*, $p > .10$), and diagnosis type (*ns*, $p > .10$).

CHAPTER IV

DISCUSSION

Over the past several decades, advances in treatment have led to an increasing number of children diagnosed with cancer surviving the disease and living into adulthood (Howlader et al., 2013). Empirical evidence has also accumulated highlighting impairments in psychosocial adjustment (e.g., Martinez et al., 2011; Piquart & Shen, 2011; Piquart & Teubert, 2011) and the need to attend to issues affecting the quality of life of this growing population of cancer survivors. Children diagnosed with cancer face a multitude of stressors associated with their diagnosis (Rodriguez et al., 2012), and may also experience significant psychosocial sequelae of pediatric cancer, including social problems (Piquart & Shen, 2011). Research on the relationship between coping and social adjustment in children diagnosed with cancer offers promising avenues towards understanding and remediating the difficulties in psychosocial adjustment experienced by these children.

Previous research has indicated a significant relationship between coping and social adjustment across typically developing children (e.g., Clarke, 2006). Specifically, secondary control coping has been found to be related to better social adjustment cross-sectionally within a limited number of pediatric samples (Jaser et al., 2011; Robinson et al., 2015). Within children diagnosed with cancer specifically, findings from cross-sectional studies indicate that secondary control coping is associated with better adjustment (Campbell et al., 2009; Compas et al., 2014), including social adjustment (e.g., Robinson et al., 2015). However, a limitation of previous research is the largely cross-sectional nature of the analyses, which precludes an understanding

of the direction and strength of the relationship between coping and social adjustment. Notably, at least two conceptual models predict contrasting directions of the relationship between coping and social adjustment (Carpenter & Scott, 1992; Yeates et al., 2007). Within typically developing samples of children and adolescents, a limited number of longitudinal studies have demonstrated that engagement coping strategies are associated with better social adjustment at later time points (Eisenberg et al., 1997; Shin & Ryan, 2011). However, none have tested the reverse relationship longitudinally, that is, from social adjustment to coping. Within pediatric populations, no studies have investigated the relationship between secondary control and social adjustment longitudinally. Understanding the relationship between coping and social adjustment beginning near diagnosis, as well as across time, has important implications for the development of effective interventions to address the psychosocial sequelae of pediatric cancer.

The study presented here offers the first examination of the relationship between secondary control coping and social problems in children diagnosed with heterogeneous cancers across the first year from diagnosis. More broadly, this study presents the first longitudinal test of both directions of the relationship between secondary control coping and social adjustment in children.

Secondary Control Coping as a Predictor of Child Social Problems

The first, second, and third hypotheses of this study pertained to the possible influence of secondary control coping on social problems, cross-sectionally and longitudinally, controlling for sociodemographic and medical covariates of interest. I first hypothesized that greater use of secondary control coping would be related to fewer social problems in cross-sectional analyses within each time point (Time 1 and Time 2), controlling for child age, family income, diagnosis type and intensity of treatment. This hypothesis was confirmed at both time points using

multivariate linear regression analyses (see Tables 3 and 4). Greater use of secondary control coping was related to lower social problems within both T1 and T2, controlling for all covariates. Family income was also negatively related to social problems within each time point. In addition, the negative association between child age and social problems approached significance at T2 and this relationship was significant at T2.

Second, I hypothesized that greater use of secondary control coping at Time 2 would be related to lower social problems at Time 2, controlling for Time 1 social problems, child age, family income, diagnosis type and intensity of treatment. This hypothesis was also confirmed using multivariate linear regression analyses (see Table 5). Children's use of secondary control coping at T2 was related to lower social problems at T2 when all variables were entered in the regression. In addition, T1 social problems were positively related to T2 social problems and child age was negatively related to T2 social problems when all variables were entered in the regression.

Third, I hypothesized that secondary control coping at Time 1 would predict lower social problems at Time 2, controlling for time 1 social problems, child age, family income, diagnosis type and intensity of treatment. This hypothesis was partially supported (see Table 6). Children's use of secondary control coping at T1 was a significant predictor of lower social problems at T2 when controlling for T1 social problems. Secondary control coping at T1 approached significance when all demographic, medical, and T1 social problems covariates were entered in the analyses. When all covariates were entered in the final step of the regression, T1 social problems and older child age were significant predictors of T2 social problems.

Overall, across the first three hypotheses, secondary control coping was related to fewer social problems, within and across time. These findings are consistent with previous cross-

sectional studies with other pediatric populations (Jaser et al., 2011; Robinson et al., 2015), as well as longitudinal studies in typically developing children (Eisenberg et al., 1997; Shin & Ryan, 2011). Secondary control coping with cancer related stressors is likely negatively related to social problems for several reasons. First, children who cope effectively with the stress associated with a pediatric cancer diagnosis are likely seen as more competent by their peers, and may therefore be more desirable friends. Second, children who use secondary control coping may be more resilient, and this resilience may translate across settings, including in response to peer related stress. This resilience may also indicate an ability to competently meet the demands of their environment and developmental level. Notably, the social problems scale includes items related to “prefers playing with younger children,” and “is dependent on others.” Children who use secondary control coping effectively may be more likely to play competently with same age peers, versus needing the safety or help of younger or older peers. Finally, it is possible that the internalizing symptoms experienced by children diagnosed with cancer (Pinquart & Shen, 2011) impact their peer relationships. The effective use of secondary control coping to manage cancer related stressors reduces the emotional distress (Compas et al., 2014) that may impact the social relationships of children diagnosed with cancer. Consistent with this, internalizing symptoms have been found to predict peer-relevant cognition, and that this in turn influences social adjustment (Zimmer-Gembeck, Hunter, Waters, & Pronk, 2009). However, others have found that depression does not predict changes in social competence over time (Cole, Martin, Powers, Truglio, 1996).

Age was also found to be associated with social problems in three of the four regressions. In all analyses in which age was a significant predictor, older age at diagnosis was associated with better social adjustment. This finding is consistent with previous research (Bonner et al.,

2008; Brinkman et al., 2012). Older children tend to have a larger, more established social network (La Greca & Bearman, 2003) and therefore may have an easier time maintaining interaction with others throughout diagnosis and early treatment. It is also possible that older children diagnosed with cancer experience difficulties that are better captured by other indices of social adjustment, for example social isolation (e.g., Vannatta, Gartstein, Short, & Noll, 1998) or difficulties in dating (e.g., Gerhardt et al., 2007; Maddrey et al., 2005). Finally, younger children may experience greater difficulties in social problems than older children/adolescents. Consistent with this, analyses using CBCL *T* scores (normed for and gender) revealed that age was not a significant predictor of social problems across all linear multiple regression analyses. Further research is needed to clarify the relationships between age, coping, and different facets of social adjustment in children diagnosed with cancer.

In two of the four regression analyses, family income was a significant predictor of child social problems. It is likely that family income is associated with a child's ability to participate in social activities, such as extracurricular activities, given the frequent costs associated with the latter (e.g., costs associated with lessons, sports equipment, organization memberships). These findings are consistent with previous research noting that parental sociodemographic variables are associated with social adjustment in children diagnosed with cancer (e.g., Barrera et al., 2005; Brinkman et al., 2012; Schultz et al., 2007). It is noteworthy that the current sample had a wide range of income distribution, with approximately half of the current sample having income at or below \$50,000 per year. This income level reflects the median family income in the United States census data (DeNavas-Walt & Proctor, 2015) and supports the representativeness of the findings from this study. Greater attention to the influence of broad indicators of family functioning (including socioeconomic status) on social adjustment has been called for (Hocking

et al., 2015). Understanding the contextual factors influencing child functioning is imperative to the development of appropriate and effective interventions.

Contrary to previous research, treatment intensity was not a significant predictor of child social problems. First, it is possible that the effects of treatment do not account for significant variance, beyond that explained by coping. Second, the analyses in this study included a measure of overall treatment intensity, whereas others have found that intensity of CNS treatment more specifically predicts poorer social adjustment in children diagnosed with brain tumors (Vannatta et al., 2007). Cranial radiation has been associated with increased risk for neurocognitive deficits due to compromised white matter integrity (Mabbott, Noseworthy, Bouffet, Rockel, & Laughlin, 2006), and impairments in neurocognitive functioning have in turn been associated with impairments in social adjustment in children diagnosed with cancer (Willard, Allen, Hardy & Bonner, 2015; Wolfe et al., 2013). Overall, although treatment intensity broadly did not predict social problems beyond coping, it is possible that cranial radiation specifically may have produced a stronger effect.

Child Social Problems as a Predictor of Secondary Control Coping

The fourth, fifth, and sixth hypotheses of this study pertained to examining the influence of social problems on secondary control coping, cross-sectionally and longitudinally, controlling for sociodemographic and medical covariates of interest. The fourth hypothesis posited that greater social problems would predict lower use of secondary control coping within each time point (Time 1 and Time 2), controlling for child age, family income, diagnosis type and intensity of treatment. This hypothesis was also confirmed (see Tables 7 and 8). In multivariate linear regression analyses predicting secondary control coping, social problems were negatively related to use of secondary control coping within each time point. At T1, but not T2, child age was also

positively related to use of secondary control coping.

Fifth, I hypothesized that fewer social problems at Time 2 would be related to greater use of secondary control coping at Time 2, controlling for Time 1 secondary control coping, child age, family income, diagnosis type and intensity of treatment. This hypothesis was not supported in the multivariate analysis (see Table 9). Social problems at T2 was negatively correlated with secondary control coping at T2 at the bivariate level only. In all subsequent steps of the regression, only children's use of secondary control coping at T1 predicted children's use of secondary control coping at T2.

Sixth, I hypothesized that fewer social problems at Time 1 would predict greater use of secondary control coping at Time 2, controlling for Time 1 secondary control coping, child age, family income, diagnosis type and intensity of treatment. This hypothesis was also not supported at the multivariate level of analysis (see Table 10). Social problems at T1 was negatively correlated with secondary control coping at T2 at the bivariate level only. In all subsequent steps of the regression, only children's use of secondary control coping at T1 predicted children's use of secondary control coping at T2.

Overall, social problems were negatively related to secondary control coping in cross-sectional multivariate analyses. However, the association between social problems and secondary control coping did not withstand longitudinal multivariate analysis. This series of finding is important in that it both builds upon and extends previous literature. These findings confirm previous studies demonstrating a significant cross-sectional relationship between social problems and coping (e.g., Robinson et al., 2015). However, social problems were no longer significantly related to secondary control coping at T2 after controlling for baseline secondary control coping. Although secondary control coping includes some strategies that involve interactions with others

(e.g., engaging in distracting activities with others), most of these strategies (e.g., positive thinking, acceptance, reappraisal) involve covert cognitive processes and are typically enacted at the individual level and therefore may be less likely to be influenced by social problems. It is possible that social problems may have a stronger longitudinal relationship with other types of coping. For example, social problems may impede the primary control coping strategy or emotional expression to others. Social problems may also contribute to isolation and a greater propensity to use avoidance as part of disengagement coping. Further research is needed to understand how social adjustment may be related to other types of coping.

Notably, longitudinal multivariate analyses revealed that children's use of secondary control coping at baseline was the only significant predictor of secondary control coping at 12 months. This finding highlights the stability of coping across time and indicates that strategies acquired through interventions teaching children secondary control skills would likely be maintained over time. Further, the absence of other significant predictors of secondary control coping at 12 months in longitudinal multivariate analyses indicates that baseline secondary control coping skills appear to be maintained over time regardless of age, income, treatment intensity, diagnosis type, prior or concurrent social problems.

Summary

In sum, these findings provide compelling insights into the relationship between secondary control coping and social problems in children diagnosed with cancer. Although previous literature has highlighted a significant relationship between coping and social adjustment, the largely cross-sectional nature of the analyses precluded a clear understanding of the direction of the relationship between these important constructs. This was the first study to test the longitudinal relationship between secondary control coping and social problems in

children diagnosed with cancer.

Consistent with previous cross-sectional studies with pediatric populations (Jaser et al., 2011; Robinson et al., 2015), secondary control coping was correlated with greater social adjustment. However, beyond the bivariate level of analyses, social problems did not predict later coping, but coping was associated with later social problems in multivariate analyses. The longitudinal relationship between secondary control coping and social adjustment found in this study is consistent with a limited number of longitudinal studies indicating that engagement coping strategies are related to greater social adjustment in typically developing children (Eisenberg et al., 1997; Shin & Ryan, 2011). The findings from this study support the Yeates et al. (2007) model of social competence, which has been applied to a growing number of studies of children diagnosed with cancer (Hocking et al., 2015). Notably, the Yeates et al. (2007) model of social competence includes a feedback loop, which is consistent with the significant cross sectional association between social problems and secondary control coping found in this study.

The pathways in the Yeates et al. (2007) have been examined and supported in longitudinal research of typically developing children (see Eisenberg, Spinrad, Eggum, 2010). According to the Yeates et al. (2007) model, emotion regulation (a facet of coping when enacted in response to a stressor) is thought to allow children to effectively engage in social information processing, and particularly, social problem solving. A child's ability to appropriately interpret social cues influences the selection of an effective social response. A child's social behaviors are then perceived by others and this over time leads an evaluation of their social adjustment. Findings from this study support the direction of the pathway from coping to social adjustment described in the Yeates et al. (2007) model.

Overall, secondary control coping was related to social adjustment longitudinally in

children diagnosed with cancer across the first year from diagnosis. A pathway from social problems to secondary control coping was not supported in longitudinal multivariate analyses. Findings from this study provide important insights on targets and timing for intervention to improve the psychosocial adjustment in children diagnosed with cancer, as well as highlight important avenues for future research.

Strengths and Limitations

There were several methodological strengths to this study. First, the sample of children recently diagnosed with cancer was relatively large. This sample size allowed for the inclusion of several covariates of interest in the analyses, including controlling for prior secondary control coping and social problems. Second, this study included longitudinal data. This was the first study examining the longitudinal relationship between secondary control coping and social adjustment in children diagnosed with cancer, and the first assessing both directions of the relationship between secondary control coping and social adjustment in children broadly. As previously mentioned, longitudinal analyses revealed a clear pattern of findings in which coping predicted social problems, but social problems did not influence later use of secondary control coping in multivariate analyses. Third, data was collected early in the treatment process. Understanding early processes is important, given that impairments in social adjustment have been found to increase over time (e.g., Kullgren et al., 2003; Mabbott, et al., 2005). Finally, this study used a measure of coping based on an empirically validated model of coping (Connor-Smith et al., 2000). Previous studies that have assessed coping in children diagnosed with cancer via other measures have generated limited insight regarding coping strategies that would improve adjustment in these children (Aldridge & Roesch, 2007). In contrast, the RSQ has allowed for the identification of specific coping strategies that are associated with better adjustment in children

diagnosed with cancer (Compas et al., 2014), as well as other pediatric populations (Compas et al., 2012).

Although this study contained notable strengths, several limitations may also be described. First, this study used single informant report of child coping and social adjustment. Findings may have been influenced by shared method variance and other informants may provide other, unique, perspectives on child coping and adjustment. Second, this study used only one measure of social adjustment, which represents only one of the three domains of social competence (Yeates et al., 2007). Third, only one type of coping was used in the present analyses. Understanding how primary control coping and disengagement coping relate to social adjustment in children diagnosed with cancer would provide a more comprehensive understanding of the relationship between coping and social adjustment in this population. Together, these present important areas for future research.

Directions for Future Research

This study provided important insights into the longitudinal relationship between secondary control coping and social problems across the first year from a pediatric cancer diagnosis. In addition, the findings highlighted several important areas for future research. First, this study included single informant reports only and future research would benefit from multiple informant reports. Second, further research examining the relationship between other domains of social competence and types of coping is needed. Third, further longitudinal data is needed to understand how the relationship between coping and social adjustment may change over time. Fourth, the relationship between coping and social adjustment can be further examined in other pediatric populations. Fifth, implications of these findings for the development of interventions are discussed.

Obtaining multiple informant reports. In this study, only maternal reports of child coping and social problems were reported. This is a limitation in that findings may be affected by shared method variance. Further, including data from other informants (e.g., fathers, classmates, child self-report) may provide valuable, potentially alternative, perspectives of the coping and social adjustment of children diagnosed with cancer. For example, the Revised Class Play (RCP; Masten, Morison & Pellegrini, 1985) has been used to obtain peer informant reports of social adjustment in children diagnosed with cancer (Noll et al., 1999; Salley et al., 2014). Other informants, such as romantic partners or spouses, may provide important insights on the use of coping strategies and social adjustment of pediatric cancer survivors as they transition to young adulthood, and may experience difficulties in dating (e.g., Gerhardt et al., 2007; Maddrey et al., 2005) and marriage (Ellenberg et al., 2009; Frobisher et al., 2007).

Examining other domains of social competence and coping. This study examined the relationship between secondary control coping and social problems, with the social problems scale used as a measure of social adjustment. Within the Yeates et al., (2007) model, two other domains of social competence exist: social information processing and social interaction. As previously mentioned, within the model of social competence (Yeates et al., 2007), emotion regulation (a facet of coping when enacted in response to a stressor) is posited to have the most direct influence on social information processing, which includes social problems solving. Secondary control coping may reduce distress in response to a stressor, and this in turn may allow children to consider more perspectives or options when social problem solving. Social information processing in turn is posited to influence social interaction. Unfortunately, there is a dearth of child social interaction data in studies of children diagnosed with cancer. Further research using direct observation of peer interactions in children diagnosed with cancer would allow for an understanding of how coping may relate to specific social behaviors. It is notable

that studies have largely focused on (and found impairment in) broad measures of social adjustment in children diagnosed with cancer (e.g., Pinquart & Teubert, 2011), but few have assessed what specific behaviors (or absence thereof) may be contributing to difficulties in social adjustment.

Further, this study included secondary control coping, but not primary control or disengagement coping. Secondary control coping was used in the current analyses given prior evidence of its relationship with emotional/behavioral adjustment (e.g., Compas et al., 2012, Compas et al., 2014) and social adjustment (e.g., Robinson et al., 2015) in children diagnosed with cancer. However, primary control coping related strategies (e.g., problem solving) have been associated with better social adjustment (Zimmer-Gembeck et al., 2011) and disengagement related coping strategies (e.g., avoidance) have been associated with difficulties in social adjustment (Eisenberg et al., 1997; Shin & Ryan, 2011) in typically developing children. Future studies should examine the relationships between primary control coping, disengagement coping, and social adjustment in children diagnosed with cancer beginning near diagnosis.

Further longitudinal data. Examining the relationship between coping and social adjustment at additional points in time from the child's diagnosis would provide a greater understanding of how this relationship may change over time. Children diagnosed with cancer will likely face different stressors as they move from diagnosis to survivorship. It is possible that primary control coping may play a greater role as children age and transition to survivorship, with problem solving being important with regards to managing follow up appointments and reducing risk behaviors. In addition, the social relationships of children diagnosed with cancer will also change as they age and move into survivorship, and may involve other relationships beyond that of those with peers. Notably, survivors of pediatric cancer have been found to be

impaired with regards to dating (Gerhardt et al., 2007; Maddrey et al., 2005), and marriage (Ellenberg et al., 2009; Frobisher et al., 2007).

Examining the relationship between coping and social adjustment in other pediatric populations. The Yeates et al. (2007) model offers a framework for understanding social competence and factors affecting social competence that may be applied to other pediatric conditions in which social adjustment is impaired. Social adjustment has been found to be impaired in children with chronic illnesses other than cancer, including sickle cell, juvenile rheumatoid arthritis, blood disorders, gastrointestinal disorders, and obesity (Martinez et al., 2011). Coping, and particularly secondary control coping, has also been related to better adjustment in children with chronic illnesses other than cancer, including diabetes and chronic pain (Compas et al., 2012). Children diagnosed with chronic illnesses face both short (e.g., hospital visits) and long term stressors (e.g., cognitive and psychosocial sequelae of the chronic illness). However, the stressors may vary greatly across illnesses. For example, relapse, infertility, and death may be stressors experienced to a greater extent by children diagnosed with cancer versus children diagnosed with juvenile rheumatoid arthritis. Understanding points of convergence and divergence regarding the relationship between coping with a chronic illness and social adjustment would provide helpful insights into tailoring intervention efforts.

Implications for interventions. Although several social skills training interventions have been developed to improve social competence in children diagnosed with cancer (Barakat et al., 2002; Barrera & Schulte., 2009; Patel, Katz, Richardson, Rimmer, & Kilian, 2009; Poggi et al., 2009; Schulte, Bartels, & Barrera, 2014; Schulte, Vannatta, & Barrera, 2014; Varni et al. 1993), results have been somewhat mixed, with several studies finding non-significant changes across indices of social adjustment (e.g., Barakat et al., 2002, Barrera & Schulte, 2009, Varni et al.,

1993). The results of this study indicate that social skills training interventions would benefit from the additional component of teaching children diagnosed with cancer secondary control coping strategies. Notably, in one intervention that included changing dysfunctional cognitive schemas and relaxation training in addition to social skills training, children diagnosed with cancer were found to improve across measures of social problems, social skills and total problems (Poggi et al., 2009). In addition to benefitting social adjustment, interventions teaching children secondary control coping skills would likely have a positive impact on a range of areas of psychosocial functioning. Secondary control coping has been found to be related to significantly lower anxiety/depression (Compas et al., 2014), lower total problems (Campbell et al., 2009, Robinson et al., 2015), and better social adjustment (Robinson et al., 2015) in children diagnosed with cancer. Further studies are needed to examine the effects of interventions teaching secondary control coping on the psychosocial adjustment of children diagnosed with cancer.

The findings from this study also point to the importance of early intervention. Secondary control coping near the time of a child's diagnosis of relapse was associated with better concurrent social adjustment, and also predicted better social adjustment approximately one year later. Early intervention is particularly important, given that impairments in social adjustment have been found to increase over time (Kullgren, Morris, Morris, & Krawiecki, 2003; Mabbott, et al., 2005). Indeed, in this sample, the percentage of children experiencing borderline impairment and clinical impairment in social problems almost doubled across time points. Thus far, interventions have focused on survivors of pediatric cancer (e.g., Barrera, & Schulte, 2009; Patel et al., 2009; Poggi et al., 2009). Future intervention efforts closer to the time of the child's diagnosis are needed.

Conclusion

Children diagnosed with cancer experience stress associated with their diagnosis and treatment and are at heightened risk for impairments in social adjustment. Although models have posited both directions of a relationship between coping and social adjustment, investigation of this relationship in pediatric populations has been limited, and has more broadly been impeded by a lack of longitudinal analyses. To elucidate this relationship, I examined both directions of the relationship between secondary control coping and social problems across the first year from a pediatric cancer diagnosis. Results of longitudinal multivariate analyses indicated that coping was a significant predictor of social adjustment, but that social adjustment did not predict coping. These findings demonstrate the influence of secondary control coping on the psychosocial adjustment of children diagnosed with cancer and highlight salient avenues for future intervention efforts as well as important directions for future research.

REFERENCES

- Abraham, M. M., & Kerns, K. A. (2013). Positive and negative emotions and coping as mediators of mother-child attachment and peer relationships. *Merrill-Palmer Quarterly*, 59(4), 399-425. doi: 10.1353/mpq.2013.0023
- Achenbach, T. M., & Rescorla, L. A. (2001). *Manual for the ASEBA school-age forms and profiles*. Burlington, VT: University of Vermont, Research Center for Children, Youth, and Families.
- Aldridge, A. A., & Roesch, S. C. (2007). Coping and adjustment in children with cancer: A meta-analytic study. *Journal of Behavioral Medicine*, 30, 115–129. doi:10.1007/s10865-006-9087-y
- Band, E. B., & Weisz, J. R. (1990). Developmental differences in primary and secondary control coping and adjustment to juvenile diabetes. *Journal of Clinical Child Psychology*, 19, 150 –158. doi:10.1207/s15374424jccp1902_7
- Barakat, L. P., Hetzke, J. D., Foley, B., Carey, M. E., Gyato, K., & Phillips, P. C. (2002). Evaluation of a social-skills training group intervention with children treated for brain tumors: a pilot study. *Journal of Pediatric Psychology*, 28(5), 299–307. doi: 10.1093/jpepsy/jsg019
- Barrera, M., & Schulte, F. (2009). A group social skills intervention program for survivors of childhood brain tumors. *Journal of Pediatric Psychology*, 34(10), 1108–18. doi:10.1093/jpepsy/jsp018
- Barrera, M., Shaw, A. K., Speechley, K. N., Maunsell, E., & Pogany, L. (2005). Educational and social late effects of childhood cancer and related clinical, personal, and

- familial characteristics. *Cancer*, 104(8),1751–1760. doi: 10.1002/cncr.21390
- Beauchamp, M. H., & Anderson, V. (2010). SOCIAL: An integrative framework for the development of social skills. *Psychological Bulletin*, 136(1), 39–64. doi: 10.1037/a0017768
- Benson, M. A., Compas, B. E., Layne, C. M., Vandergrift, N., Pasalic, H., Katalinski, R., & Pynoos, R. S. (2011). Measurement of post-war coping and stress responses: A study of Bosnian adolescents. *Journal of Applied Developmental Psychology*, 32, 323–335. doi:10.1016/j.appdev.2011.07.001
- Bonner, M. J., Hardy, K. K., Willard, V. W., Anthony, K. K., Hood, M., & Gururangan, S. (2008). Social functioning and facial expression recognition in survivors of pediatric brain tumors. *Journal of Pediatric Psychology*, 33(10), 1142-1152. doi: 10.1093/jpepsy/jsn035
- Brinkman, T. M., Palmer, S. L., Chen, S., Zhang, H., Evankovich, K., Swain, M. A., ... & Boyle, R. (2012). Parent-reported social outcomes after treatment for pediatric embryonal tumors: a prospective longitudinal study. *Journal of Clinical Oncology*, 30(33), 4134-4140. doi: 10.1200/JCO.2011.40.6702
- Campbell, L. K., Scaduto, M., Van Slyke, D., Niarhos, F., Whitlock, J. A., & Compas, B.E. (2009). Executive function, coping, and behavior in survivors of childhood acute lymphocytic leukemia. *Journal of pediatric psychology*, 34(3), 317-327. doi: 10.1093/jpepsy/jsn080
- Carpenter, B. N., & Scott, S. M. (1992). Interpersonal aspects of coping. Cavell, T. A. (1990). Social adjustment, social performance, and social skills: a tricomponent model of social competence. *Journal of Clinical Child Psychology*, 19(2), 111–122. doi:

10.1207/s15374424jccp1902_2

Cavell, T. A. (1990). Social adjustment, social performance, and social skills: a tricomponent model of social competence. *Journal of Clinical Child Psychology*, 19(2), 111–122. doi:

10.1207/s15374424jccp1902_2

Chan, S. M. (2010). Aggressive behaviour in early elementary school children: Relations to authoritarian parenting, children's negative emotionality and coping strategies. *Early Child Development and Care*, 180(9), 1253-1269. doi: 10.1080/03004430902981447

Clarke, A. T. (2006). Coping with interpersonal stress and psychosocial health among children and adolescents: A meta-analysis. *Journal of Youth and Adolescence*, 35(1), 10-23. doi:

10.1007/s10964-005-9001-x

Cole, D. A., Martin, J. M., Powers, B., & Truglio, R. (1996). Modeling causal relations between academic and social competence and depression: A multitrait-multimethod longitudinal study of children. *Journal of Abnormal Psychology*, 105(2), 258. doi: 10.1037/0021-

843X.105.2.258

Compas, B. E., Boyer, M. C., Stanger, C., Colletti, R. B., Thomsen, A. H., Dufton, L. M., & Cole, D. A. (2006). Latent variable analysis of coping, anxiety/depression, and somatic symptoms in adolescents with chronic pain. *Journal of Consulting and Clinical*

Psychology, 74, 1132–1142. doi:10.1037/0022-006X.74.6.1132

Compas, B. E., Connor-Smith, J. K., Saltzman, H., Thomsen, A. H., & Wadsworth, M. (2001). Coping with stress during childhood and adolescence: Progress, problems, and potential. *Psychological Bulletin*, 127, 87–127. doi:10.1037/0033 2909.127.1.87

Compas, B.E., Desjardins, L., Vannatta, K., Young-Saleme, T., Rodriguez, E.M., & Gerhardt, C.A. (2014). Children and adolescents coping with cancer: Self- and parent-

- reports of coping and anxiety/depression. *Health Psychology, 33*, 853-861. doi:
[10.1037/hea0000083](https://doi.org/10.1037/hea0000083)
- Compas, B. E., Jaser, S., Dunn, M. J., & Rodriguez, E. M. (2012). Coping with chronic illness in childhood and adolescence. *Annual Review of Clinical Psychology, 8*, 455–480. doi:10.1146/annurev-clinpsy-032511-143108
- Compas, B. E., Vannatta, K., Bemis, H., Desjardins, L., Murphy, L. K., Young-Saleme, T., Rodriguez, E., Dunn, M., Friedman, D., Cole, D., & Gerhardt, C. A. (Manuscript under review). Children and adolescents coping with cancer: self- and mother-reports of coping and anxiety/depression near diagnosis or relapse and 12-Months.
- Connor-Smith, J. K., Compas, B. E., Wadsworth, M. E., Thomsen, A. H., & Saltzman, H. (2000). Responses to stress in adolescence: Measurement of coping and involuntary responses to stress. *Journal of Consulting and Clinical Psychology, 68*, 976–992. doi:10.1037/0022-006X.68.6.976
- Contreras, J. M., Kerns, K. A., Weimer, B. L., Gentzler, A. L., & Tomich, P. L. (2000). Emotion regulation as a mediator of associations between mother–child attachment and peer relationships in middle childhood. *Journal of Family Psychology, 14*(1), 111. doi:10.1037/0893-3200.14.1.111
- DeLongis, A., & Holtzman, S. (2005). Coping in context: The role of stress, social support, and personality in coping. *Journal of Personality, 73*(6), 1633-1656. doi: 10.1111/j.1467-6494.2005.00361.x
- De Los Reyes, A., Thomas, S. A., Goodman, K. L., & Kundley, S. M. A. (2013). Principles underlying the use of multiple informants' reports. *Annual Review of Clinical Psychology, 9*, 123–149. doi:10.1146/annurev-clinpsy-050212-185617

- DeNavas-Walt & Proctor (2015). *Income and Poverty in the United States: 2014*. Retrieved from <https://www.census.gov/content/dam/Census/library/publications/2015/demo/p60-252.pdf>
- Eisenberg, N., Fabes, R. A., Guthrie, I. K., Murphy, B. C., Maszk, P., Holmgren, R., & Suh, K. (1996). The relations of regulation and emotionality to problem behavior in elementary school children. *Development and Psychopathology*, 8, 141-162. doi: 10.1017/S095457940000701X
- Eisenberg, N., Fabes, R. A., Nyman, M., Bernzweig, J., & Pinuelas, A. (1994). The relations of emotionality and regulation to children's anger-related reactions. *Child Development*, 65, 109-128. doi: 10.1111/j.1467-8624.1994.tb00738.x
- Eisenberg, N., Fabes, R. A., Shepard, S. A., Murphy, B. C., Guthrie, I. K., Jones, S., Friedman, J., Poulin, R., & Maszk, P. (1997). Contemporaneous and longitudinal prediction of children's social functioning from regulation and emotionality. *Child Development*, 68, 642-664. doi: 10.1111/j.1467-8624.1997.tb04227.
- Eisenberg, N., Spinrad, T. L., & Eggum, N. D. (2010). Emotion-related self-regulation and its relation to children's maladjustment. *Annual Review of Clinical Psychology*, 6, 495. doi: 10.1146/annurev.clinpsy.121208.131208
- Ellenberg, L., Liu, Q., Gioia, G., Yasui, Y., Packer, R. J., Mertens, A., ... & Zeltzer, L. K. (2009). Neurocognitive status in long-term survivors of childhood CNS malignancies: a report from the Childhood Cancer Survivor Study. *Neuropsychology*, 23(6), 705. doi: [10.1037/a0016674](https://doi.org/10.1037/a0016674)
- Erath, S. A., & Tu, K. M. (2014). Peer stress in preadolescence: Linking physiological and

- coping responses with social competence. *Journal of Research on Adolescence*, 24(4), 757-771. doi: 10.1111/jora.12085
- Fields, L., & Prinz, R. J. (1997). Coping and adjustment during childhood and adolescence. *Clinical psychology review*, 17(8), 937-976. doi: 10.1016/S0272-7358(97)00033-0
- French, D.C., Conrad, J. (2001). School dropout as predicted by peer rejection and antisocial behavior. *Journal of Research on Adolescence*, 11(3), 225–244. doi: 10.1111/1532-7795.00011
- Frobisher, C., Lancashire, E. R., Winter, D. L., Jenkinson, H. C., & Hawkins, M. M. (2007). Long-term population-based marriage rates among adult survivors of childhood cancer in Britain. *International Journal of Cancer*, 121(4), 846-855. doi: 10.1002/ijc.22742
- Gerhardt, C. A., Vannatta, K., Valerius, K. S., Correll, J., & Noll, R. B. (2007). Social and romantic outcomes in emerging adulthood among survivors of childhood cancer. *Journal of Adolescent Health*, 40(5), 462-469. doi: 10.1016/j.jadohealth.2006.12.004
- Gest, S. D., Sesma, A., Jr., Masten, A. S., & Tellegen, A. (2006). Childhood peer reputation as a predictor of competence and symptoms 10 years later. *Journal of Abnormal Child Psychology*, 34(4), 509–526. doi: 10.1007/s10802-006-9029-8
- Gurney, J. G., Krull, K. R., Kadan-Lottick, N., Nicholson, H. S., Nathan, P. C., Zebrack, B., ... & Ness, K. K. (2009). Social outcomes in the childhood cancer survivor study cohort. *Journal of Clinical Oncology*, 27(14), 2390-2395. doi: 10.1200/JCO.2008.21.1458
- Han, S. S., Weisz, J. R., & Weiss, B. (2001). Specificity of relations between children's control-related beliefs and internalizing and externalizing psychopathology. *Journal of Consulting and Clinical Psychology*, 69(2), 240. doi: [10.1037/0022-006X.69.2.240](https://doi.org/10.1037/0022-006X.69.2.240)
- Hardy, K. K., Willard, V., Watral, M., & Bonner, M. (2010). Perceived social competency in

- children with brain tumors: Comparison between children on and off therapy. *Journal of Pediatric Oncology Nursing*, 27(3), 156-163. doi: 10.1177/1043454209357918
- Hocking, M. C., McCurdy, M., Turner, E., Kazak, A. E., Noll, R. B., Phillips, P., & Barakat, L. P. (2015). Social competence in pediatric brain tumor survivors: Application of a model from social neuroscience and developmental psychology. *Pediatric Blood & Cancer*, 62(3), 375-384. doi: 10.1002/pbc.25300
- Holtzman, S., Newth, S., & DeLongis, A. (2004). The role of social support in coping with daily pain among patients with Rheumatoid Arthritis. *Journal of Health Psychology*, 9, 677–695. doi: 10.1177/1359105304045381
- Howlader, N., Noone, A. M., Krapcho, M., Garshell, J., Neyman, N.,... & Cronin, K. A. (2013). *SEER Cancer Statistics Review, 1975-2012*. (Retrieved from: http://seer.cancer.gov/csr/1975_2012/). Accessed 20 November 2015.
- Jaser, S. S., & White, L. E. (2011). Coping and resilience in adolescents with type 1 diabetes. *Child: care, health and development*, 37(3), 335-342. doi: 10.1111/j.1365-2214.2010.01184.x
- Kliewer, W., & Sandler, I. N. (1993). Social competence and coping among children of divorce. *American Journal of Orthopsychiatry*, 63(3), 432. doi: [10.1037/h0079441](https://doi.org/10.1037/h0079441)
- Koocher, G. P., O'Malley, J. E., Gogan, J. L., & Foster, D. J. (1980). Psychological adjustment among pediatric cancer survivors. *Journal of Child Psychology and Psychiatry*, 21(2), 163-173. doi: 10.1111/j.1469-7610.1980.tb00028.x
- Kullgren, K. A., Morris, R. D., Morris, M. K., & Krawiecki, N. (2003). Risk factors associated with long-term social and behavioral problems among children with brain tumors. *Journal of Psychosocial Oncology*, 21(1), 73-87. doi: 10.1300/J077v21n01_04

- La Greca, A., Bearman, K., & Moore, H. (2003). Peer Relations. In Brown, R. T. (Ed.). *Handbook of pediatric psychology in school settings* (p. 657-678). Mahwah, NJ: Lawrence Erlbaum Associates.
- Lazarus, R. S., & Folkman, S. (1984). *Stress, Appraisal, and Coping*. Springer, New York.
- Lemerise, E. A., & Arsenio, W. F. (2000). An integrated model of emotion processes and cognition in social information processing. *Child Development, 71*, 107–118. doi: 10.1111/1467-8624.00124
- Mabbott, D. J., Noseworthy, M. D., Bouffet, E., Rockel, C., & Laughlin, S. (2006). Diffusion tensor imaging of white matter after cranial radiation in children for medulloblastoma: correlation with IQ. *Neuro-oncology, 8*(3), 244-252. doi: 10.1215/15228517-2006-002
- Mabbott, D. J., Spiegler, B. J., Greenberg, M. L., Rutka, J. T., Hyder, D. J., & Bouffet, E. (2005). Serial evaluation of academic and behavioral outcome after treatment with cranial radiation in childhood. *Journal of Clinical Oncology, 23*(10), 2256-2263. doi: 10.1200/JCO.2005.01.158
- Macartney, G., Harrison, M. B., VanDenKerkhof, E., Stacey, D., & McCarthy, P. (2014). Quality of Life and Symptoms in Pediatric Brain Tumor Survivors A Systematic Review. *Journal of Pediatric Oncology Nursing, 31*(2), 65-77. doi: 10.1177/1043454213520191
- Maddrey, A. M., Bergeron, J. A., Lombardo, E. R., McDonald, N. K., Mulne, A. F., Barenberg, P. D., & Bowers, D. C. (2005). Neuropsychological performance and quality of life of 10 year survivors of childhood medulloblastoma. *Journal of Neuro-Oncology, 72*(3), 245-253. doi: 10.1007/s11060-004-3009-z
- Manne, S. L., & Zautra, A. J. (1989). Spouse criticism and support: their association with coping and psychological adjustment among women with rheumatoid arthritis. *Journal of*

- personality and social psychology*, 56(4), 608. doi: [10.1037/0022-3514.56.4.608](https://doi.org/10.1037/0022-3514.56.4.608)
- Martinez, W., Carter, J. S., & Legato, L. J. (2011). Social competence in children with chronic illness: A meta-analytic review. *Journal of Pediatric Psychology*, 36(8), 878-890. doi: 10.1093/jpepsy/jsr035
- Maurice-Stam, H., Oort, F.J., Last, B.F., Brons, P.P.T., Caron, H.N., & Grootenhuis, M.A. (2009). School-aged children after the end of non-central nervous system cancer: Longitudinal assessment of health-related quality of life, anxiety and coping. *European Journal of Cancer Care*, 18, 401-410. doi: 10.1111/j.1365-2354.2008.01041.x
- Maurice-Stam, H., Silberbusch, L. M., Last, B. F., & Grootenhuis, M. A. (2009). Evaluation of a psycho-educational group intervention for children treated for cancer: A descriptive pilot study. *Psycho-Oncology*, 18, 762–766. doi:10.1002/pon.1470
- Meeske, K., Katz, E. R., Palmer, S. N., Burwinkle, T., & Varni, J. W. (2004). Parent proxy–reported health-related quality of life and fatigue in pediatric patients diagnosed with brain tumors and acute lymphoblastic leukemia. *Cancer*, 101(9), 2116-2125. doi: 10.1002/cncr.20609
- Meijer, S. A., Sinnema, G., Bijstra, J. O., Mellenbergh, G. J., & Wolters, W. H. (2002). Coping styles and locus of control as predictors for psychological adjustment of adolescents with a chronic illness. *Social Science & Medicine*, 54(9), 1453-1461. doi: 10.1016/S0277-9536(01)00127-7
- Miller, M. L., Omens, R. S., & Delvadia, R. (1991). Dimensions of social competence: Personality and coping style correlates. *Personality and Individual Differences*, 12(9), 955-964. doi: 10.1016/0191-8869(91)90185-E
- Miller, K.S., Vannata, K., Compas, B.E., Vasey, M., McGoron, K.D., Rutherford, C.G., &

- Gerhardt, C.A. (2009). The role of coping and temperament in the adjustment of children with cancer. *Journal of Pediatric Psychology, 34*, 1135-1143. doi: 10.1093/jpepsy/jsp037
- Morison, P., & Masten, A. S. (1991). Peer reputation in middle childhood as a predictor of adaptation in adolescence: A seven year follow-up. *Child Development, 62*(5), 991-1007. doi: 10.1111/j.1467-8624.1991.tb01585.x
- Noll, R. B., Gartstein, M. A., Vannatta, K., Correll, J., William, M., Davies, W. H., & Bukowski, W. M. (1999) Social, emotional, and behavioral functioning of children with cancer. *Pediatrics, 103*(1), 71–78.
- Osowiecki, D. M., & Compas, B. E. (1999). A prospective study of coping, perceived control and psychological adjustment to breast cancer. *Cognitive Therapy and Research, 23*, 169–180. doi:10.1023/A: 1018779228432
- Patel, S. K., Katz, E. R., Richardson, R., Rimmer, M., & Kilian, S. (2009). Cognitive and problem solving training in children with cancer: A pilot project. *Journal of Pediatric Hematology/Oncology, 31*, 670–677. doi:10.1097/MPH.0b013e3181b25a1d
- Phipps, S., Steel, R.G., Hall, K., & Leigh, L. (2001). Repressive adaptation in children with cancer: A replication and extension. *Health Psychology, 20*, 445-451. doi: 10.1037/0278-6133.20.6.445
- Pinquart, M., & Shen, Y. (2011). Behavior problems in children and adolescents with chronic physical illness: A meta-analysis. *Journal of Pediatric Psychology, 36*(9), 1003-1016. doi: 10.1093/jpepsy/jsr042
- Pinquart, M., & Teubert, D. (2011). Academic, physical, and social functioning of children and adolescents with chronic physical illness: A meta-analysis. *Journal of Pediatric Psychology, 37*(4), 376-389. doi: 10.1093/jpepsy/jsr106

- Poggi, G., Liscio, M., Pastore, V., Adduci, A., Galbiati, S., Spreafico, F., . . . Massimino, M. (2009). Psychological intervention in young brain tumor survivors: The efficacy of the cognitive behavioural approach. *Disability and Rehabilitation: An International, Multidisciplinary Journal*, 31, 1066–1073. doi:10.1080/09638280802509546
- Reijntjes, A., Stegge, H., & Meerum Terwogt, M. (2006). Children's coping with peer rejection: The role of depressive symptoms, social competence, and gender. *Infant and Child Development*, 15(1), 89. doi: 10.1002/icd.435
- Robinson, K. E., Pearson, M. M., Cannistraci, C. J., Anderson, A. W., Kuttusch Jr, J. F., Wymer, K., ... & Compas, B. E. (2015). Functional neuroimaging of working memory in survivors of childhood brain tumors and healthy children: Associations with coping and psychosocial outcomes. *Child Neuropsychology*, 21(6), 779-802. doi: 10.1080/09297049.2014.924492
- Rodriguez, E. M., Dunn, M. J., Zuckerman, T., Vannatta, K., Gerhardt, C. A., & Compas, B. E. (2012). Cancer-related sources of stress for children with cancer and their parents. *Journal of Pediatric Psychology*, 37, 185–197. doi:10.1093/jpepsy/jsr054
- Roth, S., & Cohen, L. J. (1986). Approach, avoidance, and coping with stress. *American Psychologist*, 41, 813–819. doi: [10.1037/0003-066X.41.7.813](https://doi.org/10.1037/0003-066X.41.7.813)
- Rothbaum, F., Weisz, J. R., & Snyder, S. S. (1982). Changing the world and changing the self: A two-process model of perceived control. *Journal of Personality and Social Psychology*, 42, 5-37. doi: [10.1037/0022-3514.42.1.5](https://doi.org/10.1037/0022-3514.42.1.5)
- Rudolph, K. D., Dennig, M. D., & Weisz, J. R. (1995). Determinants and consequences of children's coping in the medical setting: Conceptualization, review, and critique. *Psychological Bulletin*, 118, 328-357. doi: [10.1037/0033-2909.118.3.328](https://doi.org/10.1037/0033-2909.118.3.328)

- Salley, C. G., Hewitt, L., Patenaude, A., Vasey, M., Yeates, K. O., Gerhardt, C., & Vannatta, K. (2014). Temperament, social behavior in pediatric brain tumor survivors and comparison peers. *Journal of Pediatric Psychology, 40*(3), 297-308. doi: 10.1093/jpepsy/jsu083
- Schulte, F., & Barrera, M. (2010). Social competence in childhood brain tumor survivors: a comprehensive review. *Supportive Care in Cancer, 18*(12), 1499-1513. doi: 10.1007/s00520-010-0963-1
- Schulte, F., Bartels, U., & Barrera, M. (2014). A pilot study evaluating the efficacy of a group social skills program for survivors of childhood central nervous system tumors using a comparison group and teacher reports. *Psycho-Oncology, 23*(5), 597-600. doi: 10.1002/pon.3472
- Schulte, F., Vannatta, K., & Barrera, M. (2014). Social problem solving and social performance after a group social skills intervention for childhood brain tumor survivors. *Psycho-Oncology, 23*(2), 183-189. doi: 10.1002/pon.3387
- Schultz, K. A., Ness, K. K., Whitton, J., Recklitis, C., Zebrack, B., Robison, L. L., ... Mertens, A.C. (2007). Behavioral and social outcomes in adolescent survivors of childhood cancer: A report from the Childhood Cancer Survivor Study. *Journal of Clinical Oncology, 25*, 3649-3656. doi:10.1200/JCO.2006.09.2486
- Shin, H., & Ryan, A. M. (2011). How do young adolescents cope with social problems? An examination of social goals, coping with friends, and social adjustment. *The Journal of Early Adolescence*, doi: 10.1177/0272431611429944
- Siegel, R. L., Miller, K. D., & Jemal, A. (2016). Cancer statistics, 2016. *CA: A Cancer Journal for Clinicians, 66*(1), 7-30. doi: 10.3322/caac.21332
- Skinner, E. A., Edge, K., Altman, J., & Sherwood, H. (2003). Searching for the structure of

- coping: a review and critique of category systems for classifying ways of coping.
Psychological Bulletin, 129(2), 216. doi: [10.1037/0033-2909.129.2.216](https://doi.org/10.1037/0033-2909.129.2.216)
- Skinner, E. A., & Zimmer-Gembeck, M. J. (2007). The development of coping. *Annual Review of Psychology*, 58, 119-144. doi: [10.1146/annurev.psych.58.110405.085705](https://doi.org/10.1146/annurev.psych.58.110405.085705)
- Stam, H., Grootenhuis, M. A., & Last, B. F. (2005). The course of life of survivors of childhood cancer. *Psycho-Oncology*, 14(3), 227-238. doi: [10.1002/pon.839](https://doi.org/10.1002/pon.839)
- Swanson, J., Valiente, C., Lemery-Chalfant, K., & O'Brien, T. C. (2011). Predicting early adolescents' academic achievement, social competence, and physical health from parenting, ego resilience, and engagement coping. *The Journal of Early Adolescence*, 31(4), 548-576. doi: [10.1177/0272431610366249](https://doi.org/10.1177/0272431610366249)
- Van Dijk, J., Grootenhuis, M. A., Imhof, S. M., Cohen-Kettenis, P. T., Moll, A. C., & Huisman, J. (2009). Coping strategies of retinoblastoma survivors in relation to behavioural problems. *Psycho-Oncology*, 18(12), 1281-1289. doi: [10.1002/pon.1507](https://doi.org/10.1002/pon.1507)
- Van Dongen-Melman, J. E. W. M., Pruyn, J. F. A., Van Zanen, G. E., & Sanders-Woudstra, J. A. R. (1986). Coping with childhood cancer: A conceptual view. *Journal of Psychosocial Oncology*, 4(1-2), 147-161. doi: [10.1300/J077v04n01_11](https://doi.org/10.1300/J077v04n01_11)
- Vannatta, K., Gerhardt, C. A., Wells, R. J., & Noll, R. B. (2007). Intensity of CNS treatment for pediatric cancer: Prediction of social outcomes in survivors. *Pediatric Blood & Cancer*, 49(5), 716-722. doi: [10.1002/pbc.21062](https://doi.org/10.1002/pbc.21062)
- Varni, J. W., and Katz, E. R. (1997). Stress, social support and negative affectivity in children with newly diagnosed cancer: A prospective transactional analysis. *Psycho-Oncology* 6, 267-278. doi: [10.1002/\(SICI\)1099-1611\(199712\)6:4<267::AID-PON277>3.0.CO;2-O](https://doi.org/10.1002/(SICI)1099-1611(199712)6:4<267::AID-PON277>3.0.CO;2-O)
- Varni, J.W., Katz, E. R., Colegrove, R., Jr., & Dolgin, M. (1993). The impact of social skills

- training on the adjustment of children with newly diagnosed cancer. *Journal of Pediatric Psychology*, 18, 751–767. doi: 10.1093/jpepsy/18.6.751
- Vitaliano, P. P., Maiuro, R. D., Russo, J., & Becker, J. (1987). Raw versus relative scores in the assessment of coping strategies. *Journal of Behavioral Medicine*, 10, 1-18. doi: 10.1007/BF00845124
- Wadsworth, M.E., Reickmann, T., Benson, M., & Compas, B.E. (2004). Coping and responses to stress in Navajo adolescents: Psychometric properties of the Responses to Stress Questionnaire. *Journal of Community Psychology*, 32, 391-411. doi: 10.1002/jcop.20008
- Ward, E., DeSantis, C., Robbins, A., Kohler, B., Jemal, A. (2014). Childhood and adolescent cancer statistics. *CA: A Cancer Journal for Clinicians*, 64(2), 83-103. doi: 10.3322/caac.21219
- Weisz, J. R., McCabe, M. A., & Dennig, M. D. (1994). Primary and secondary control among children undergoing medical procedures: Adjustment as a function of coping style. *Journal of Consulting and Clinical Psychology*, 62, 324-332. doi: [10.1037/0022-006X.62.2.324](https://doi.org/10.1037/0022-006X.62.2.324)
- Weisz, J. R., Rothbaum, F. M., & Blackburn, T. C. (1984). Standing out and standing in: The psychology of control in America and Japan. *American Psychologist*, 39, 955–969. doi:10.1037/0003-066X.39.9.955
- Werba, B. E., Hobbie, W., Kazak, A. E., Ittenbach, R. F., Reilly, A. F., & Meadows, A. T. (2007). Classifying the intensity of pediatric cancer treatment protocols: The intensity of treatment rating scale 2.0 (ITR-2). *Pediatric Blood & Cancer*, 48(7), 673-677. doi: 10.1002/pbc.21184

- Willard, V. W., Allen, T. M., Hardy, K. K., & Bonner, M. J. (2015). Social Functioning in Survivors of Pediatric Brain Tumors: Contribution of Neurocognitive and Social-Cognitive Skills. *Children's Health Care*. Advance online publication. doi: 10.1080/02739615.2015.1124769
- Wolfe, K. R., Walsh, K. S., Reynolds, N. C., Mitchell, F., Reddy, A. T., Paltin, I., & Madan-Swain, A. (2013). Executive functions and social skills in survivors of pediatric brain tumor. *Child Neuropsychology, 19*(4), 370-384. doi: 10.1080/09297049.2012.669470
- Yao, S., Xiao, J., Zhu, X., Zhang, C., Auerbach, R. P., Mcwhinnie, C. M., & Abela, J. R. Z. (2010). Coping and involuntary responses to stress in Chinese university students: Psychometric properties of the Responses to Stress Questionnaire. *Journal of Personality Assessment, 92*, 356–361. doi: 10.1080/00223891.2010.482015
- Yeates, K. O., Bigler, E. D., Dennis, M., Gerhardt, C. A., Rubin, K. H., Stancin, T., ... & Vannatta, K. (2007). Social outcomes in childhood brain disorder: a heuristic integration of social neuroscience and developmental psychology. *Psychological Bulletin, 133*(3), 535. doi: [10.1037/0033-2909.133.3.535](https://doi.org/10.1037/0033-2909.133.3.535)
- Zimmer-Gembeck, M. J., Hunter, T. A., Waters, A. M., & Pronk, R. (2009). Depression as a longitudinal outcome and antecedent of preadolescents' peer relationships and peer-relevant cognition. *Development and Psychopathology, 21*(02), 555-577. doi: [10.1017/S0954579409000303](https://doi.org/10.1017/S0954579409000303)
- Zimmer-Gembeck, M. J., Lees, D., & Skinner, E. A. (2011). Children's emotions and coping with interpersonal stress as correlates of social competence. *Australian Journal of Psychology, 63*(3), 131-141. doi: 10.1111/j.1742-9536.2011.00019.x

Table 1.

Descriptive Statistics: Social Problems, Secondary Control Coping, Medical and Demographic Variables.

	<i>M</i>	<i>SD</i>	<i>Borderline Clinical Range</i>	<i>Clinical Range</i>
T1 Social problems	53.73	5.57	5.4%	2.5%
T2 Social problems	54.42	6.37	10.7%	4.2%
T1 Secondary Control Coping	.28	.06		
T2 Secondary Control Coping	.28	.06		
Child age at T1 (years)	10.69	3.96		
	N	%		
Annual family income				
25,000 or under	92	26.7		
25,001 to 50,000	90	26.2		
50,001 to 75, 000	49	14.2		
75,001 to 100,000	36	10.5		
100, 001 or more	50	14.5		
Diagnosis				
Leukemia, Lymphoma, Other solid tumor	307	89.2		
Brain tumor	29	8.4		
Treatment intensity				
Least Intensive	7	2.0		
Moderately Intensive	121	35.2		
Very Intensive	140	40.7		
Most Intensive	59	17.2		

Note. Means and standard deviations are presented for the full sample. Social problems are presented as normalized *T* scores from the CBCL (Child Behavior Checklist). Secondary control coping is presented as a ratio score from the RSQ –PC (Responses to Stress Questionnaire-Pediatric Cancer version).

Table 2.

Preliminary Analyses: Correlations Between Demographic and Medical Variables with Secondary Control Coping and Social Problems.

	Social Problems		Secondary Control Coping	
	T1	T2	T1	T2
Child age	-.16**	-.19**	.16**	.05
Annual family income	-.25***	-.22**	.05	.02
Treatment Intensity	.06	-.04	.07	.01

Note: N = 233-320; T2 N = 161-219;

* $p < .05$; ** $p < .01$; *** $p < .001$. T1

Table 3.
Effects of Secondary Control Coping on Social Problems at T1.

DV = Social Problems T1			
	<i>b</i>	β	<i>R</i> ²
Step 1			.04***
Intercept	4.17***	--	
SCC T1	-8.22	-.20***	
Step 2			.10***
Intercept	5.37***	--	
SCC T1	-6.85	-.17**	
Child Age	-0.06	-.10+	
Family Income	-0.38	-.22***	
Diagnosis type	0.64	.07	

Note: SCC = secondary control coping.
 p* < .05; *p* < .01; ****p* < .001

Table 4.
Effects of Secondary Control Coping on Social Problems at T2.

DV = Social Problems T2			
	<i>b</i>	β	<i>R</i> ²
Step 1			.04*
Intercept	5.00***	--	
SCC T2	-9.95	-.21**	
Step 2			.09**
Intercept	7.41***	--	
SCC T2	-9.46	-.20**	
Child Age	-0.11	-.15*	
Family Income	-0.38	-.19**	
Treatment Intensity	-0.07	-.02	
Diagnosis type	0.36	.04	

Note: SCC = secondary control coping; SP = social problems.
 p* < .05; *p* < .01; ****p* < .001.

Table 5.
Effects of Secondary Control Coping on Social Problems at T2, Controlling for T1 Social Problems.

DV = Social Problems T2			
	<i>b</i>	β	<i>R</i> ²
Step 1			.04**
Intercept	5.15***	--	
SCC T2	-10.47	-.22**	
Step 2			.44***
Intercept	2.43**	--	
SCC T2	-5.47	-.11*	
SP T1	0.71	.64***	
Step 2			.45***
Intercept	3.96***	--	
SCC T2	-5.47	-.11*	
SP T1	0.69	.62***	
Child Age	-0.09	-.13*	
Family Income	-0.10	-.05	
Treatment Intensity	-0.10	-.03	
Diagnosis type	-0.29	-.03	

Note: SCC = secondary control coping; SP = social problems.
 p* < .05; *p* < .01; ****p* < .001.

Table 6.
Effects of Secondary Control Coping at T1 on Social Problems at T2, Controlling for T1 Social Problems.

	DV = Social Problems T2		
	<i>b</i>	β	<i>R</i> ²
Step 1			.05**
Intercept	5.13***	--	
SCC T1	-10.67	-.23**	
Step 2			.45***
Intercept	2.32**	--	
SCC T1	-5.21	-.11*	
SP T1	0.71	.64***	
Step 2			.46***
Intercept	3.41***	--	
SCC T1	-4.19	-.09+	
SP T1	0.70	.63***	
Child Age	-0.09	-.12*	
Family Income	-0.08	-.04	
Treatment Intensity	-0.09	-.02	
Diagnosis type	-0.11	-.01	

Note: SCC = secondary control coping; SP = social problems.
 p* < .05; *p* < .01; ****p* < .001.

Table 7.
Effects of Social Problems on Secondary Control Coping at T1.

DV = SCC T1			
	<i>b</i>	β	<i>R</i> ²
Step 1			.04***
Intercept	0.29***	--	
SP T1	-0.01	-.20***	
Step 2			.05***
Intercept	0.26***	--	
SP T1	-0.004	-.18**	
Child Age	0.002	.13*	
Family Income	0.000	-.002	
Diagnosis type	-0.01	-.05	

Note: SCC = secondary control coping; SP = social problems.
 p* < .05; *p* < .01; ****p* < .001.

Table 8.
Effects of Social Problems on Secondary Control Coping at T2.

DV = SCC T2			
	<i>b</i>	β	<i>R</i> ²
Step 1			.04**
Intercept	0.29***	--	
SP T2	-0.004	-.21**	
Step 2			.02+
Intercept	0.30***	--	
SP T2	-0.004	-.21**	
Child Age	0.000	-.01	
Family Income	-0.001	-.03	
Treatment Intensity	0.001	.02	
Diagnosis type	-0.01	-.06	

Note: SCC = secondary control coping; SP = social problems.
 p* < .05; *p* < .01; ****p* < .001.

Table 9.
Effects of Social Problems on Secondary Control Coping at T2, Controlling for T1 Secondary Control Coping.

	DV = Secondary Control Coping T2		
	<i>b</i>	β	<i>R</i> ²
Step 1			.04**
Intercept	0.29***	--	
SP T2	-0.004	-.21**	
Step 2			.32***
Intercept	0.15***	--	
SP T2	-0.002	-.08	
SCC T1	0.52	.55***	
Step 2			.32***
Intercept	0.16***	--	
SP T2	-0.002	-.10	
SCC T1	0.53	.56***	
Child Age	-0.001	-.08	
Family Income	-0.001	-.03	
Treatment Intensity	-0.002	-.03	
Diagnosis type	-0.001	-.003	

Note: SCC = secondary control coping; SP = social problems.
 p* < .05; *p* < .01; ****p* < .001.

Table 10.

Effects of Social Problems at T1 on Secondary Control Coping at T2, Controlling for T1 Secondary Control Coping.

	DV = Secondary Control Coping T2		R^2
	b	β	
Step 1			.02*
Intercept	0.29***	--	
SP T1	-0.004	-.16*	
Step 2			.33***
Intercept	0.14***	--	
SP T1	-0.001	-.06	
SCC T1	0.54	.56***	
Step 2			.32***
Intercept	0.15***	--	
SP T1	-0.001	-.07	
SCC T1	0.55	.58***	
Child Age	-0.001	-.07	
Family Income	-0.002	-.04	
Treatment Intensity	-0.001	-.02	
Diagnosis type	-0.001	-.007	

Note: SCC = secondary control coping; SP = social problems.

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