

Maternal Coping and Depressive Symptoms as Predictors of Mother–Child Communication About a Child’s Cancer

Erin M. Rodriguez,¹ PhD, Lexa Murphy,² MS, Kathryn Vannatta,^{3,4} PhD, Cynthia A. Gerhardt,^{3,4} PhD, Tammi Young-Saleme,^{3,4} PhD, Megan Saylor,² PhD, Heather Bemis,² MS, Leandra Desjardins,² MS, Madeleine J. Dunn,² PhD, and Bruce E. Compas,² PhD

¹University of Texas at Austin, ²Vanderbilt University, ³The Research Institute at Nationwide Children’s Hospital, and ⁴The Ohio State University

All correspondence concerning this article should be addressed to Erin M. Rodriguez, PhD, Department of Educational Psychology, University of Texas at Austin, 1 University Station, D5800, Austin, TX 78712, USA. E-mail: erodriguez@austin.utexas.edu

Received February 2, 2015; revisions received September 7, 2015; accepted October 12, 2015

Abstract

Objective This study sought to identify possible associations between maternal coping and depression and subsequent mother–child communication about cancer following the child’s diagnosis. **Method** Mothers ($N=100$) reported on coping and depressive symptoms shortly after the child’s diagnosis ($M=1.9$ months). Subsequently, we observed children (age 5–17 years; $M=10.2$ years; 48% female; 81% White) and mothers discussing cancer and coded maternal communication. **Results** Higher primary and secondary control coping, and lower depressive symptoms, were generally correlated with more positive, and less harsh and withdrawn communication. In regression models, higher primary control coping (i.e., coping efforts to change the stressor or one’s emotional reaction to the stressor) independently predicted less withdrawn communication, and depressive symptoms mediated relations between coping and harsh communication. **Conclusions** Maternal primary control coping and depressive symptoms predict mothers’ subsequent harsh and withdrawn communication about cancer.

Key words: cancer; coping; depression; mother–child communication.

Introduction

Mothers of children with cancer are typically the child’s primary caregivers throughout treatment and are faced with the dual tasks of providing emotional support to their child and facilitating their child’s understanding of information about the disease (Dunn et al., 2011). Mothers’ communication about cancer may be crucial to children’s adjustment following diagnosis, as maternal communication style is a key predictor of child psychosocial adjustment and health (Conger, Patterson, & Ge, 1995; Jaser & Grey, 2010; Lim, Wood, Miller, & Simmens, 2011). However,

communication may be challenging for some mothers due to use of ineffective strategies to cope with their child’s illness. Coping may directly impact mothers’ parenting and interpersonal skills (DeLongis & Preece, 2002; Smith Bynum & Brody, 2005) and interfere with the ability to provide support and clear explanations (Fivush & Sales, 2006). Ineffective coping may also lead to elevated distress (Greening & Stoppelbein, 2007), which may disrupt mothers’ interactions with their children (Errázuriz Arellano, Harvey, & Thakar, 2012; Leung & Slep, 2006). Therefore, mothers’ ability to cope with their child’s

cancer and manage their own distress may be important for communicating effectively with their child. However, no studies have examined mother–child communication about cancer in the context of maternal coping with the disease.

Following a child's cancer diagnosis and throughout treatment, mothers' coping abilities may help to manage disease-related demands and stressors and facilitate communication with their child. Coping refers to conscious, volitional efforts to regulate cognitions, emotions, behavior, physiology, and/or the environment in response to stress (Compas et al., 2001; Compas, Jaser, Dunn, & Rodriguez, 2012). An empirically supported, control-based model of coping (Compas et al., 2012; Weisz, Francis, & Bearman, 2010) suggests that coping is organized along engagement and disengagement dimensions, with the engagement dimension consisting of primary control coping and secondary control coping. These factors have been validated through confirmatory factor analysis in studies with adults (Compas et al., 2006; Wadsworth, Raviv, Compas, & Connor-Smith, 2005). Primary control coping includes efforts to change a stressor or one's emotional reaction to a stressor (e.g., problem solving, emotional expression, emotion modulation). Secondary control coping refers to efforts to adapt or accommodate to a stressor (e.g., acceptance, cognitive restructuring).

Primary and secondary control coping may impact mothers' communication with their children about cancer. Interpersonal models of coping (e.g., relationship-focused coping, DeLongis & Preece, 2002; dyadic coping, Bodenmann, Pihet, & Kayser, 2006) theorize that coping manifests as interpersonal behaviors, such as cooperation, withdrawal, and aggression/hostility, during interpersonal interactions (DeLongis & Preece, 2002). In the context of family interactions, mothers' effective interpersonal coping would allow them to draw on more effective parenting skills and lead to a more positive mother–child relationship (Smith Bynum & Brody, 2005). Within a model of interpersonal coping, both primary and secondary control coping may manifest as more prosocial maternal interpersonal behaviors, including responsiveness, warmth, and child-centeredness. Primary control coping involves problem solving and the expression and regulation of emotions, which may allow mothers to organize information and provide it to their children in a child-centered manner. Secondary control coping, involving positive thinking and cognitive restructuring, would allow mothers to maintain a positive, warm, and supportive emotional climate while discussing potentially distressing topics. Higher use of primary and secondary control strategies would also prevent more harsh and withdrawn communication behaviors. The implications of maternal coping for mother–child communication are

supported by findings on maternal communication about asthma. In mother–child conversations about asthma, maternal active and support-seeking coping (which involve aspects of primary and secondary control) were associated with maternal engagement with the child during conversations, and support-seeking coping was associated with maternal explanations (Fivush & Sales, 2006). Nevertheless, research on maternal coping and mother–child communication has been limited, and has not been examined in the context of children currently undergoing treatment for cancer.

Whereas primary and secondary control coping may help mothers communicate more effectively with their children, maternal distress following diagnosis may disrupt mother–child communication and lead to negative outcomes for children. Several theoretical models have proposed an association between higher levels of maternal depressive symptoms and more negative mother–child communication and child adjustment (e.g., The Family Stress Model; Conger et al., 1995; and the Biobehavioral Family Model of pediatric asthma; Lim, Wood, & Miller, 2008; Lim et al., 2008). Empirical research also indicates that maternal depressive symptoms have a detrimental impact on mother–child communication in families of healthy and chronically ill children, leading to both overreactive/harsh and lax/withdrawn styles of interaction with the child (Errázuriz Arellano et al., 2012; Leung & Slep, 2006; Lim et al., 2008, 2011; Rodriguez et al., 2013).

Theoretical models and research findings that have linked maternal depression and mother–child interactions are relevant for families of children with cancer given the mildly to moderately elevated levels of distress experienced by many mothers following the child's cancer diagnosis (Pai et al., 2007). The majority of research on mother–child communication in pediatric cancer has focused on procedural distress, but findings are consistent with prior research and theoretical models. Specifically, for families of children with cancer, less child distress during painful medical procedures is associated with supportive parental communication (Spagrud et al., 2008), while a critical, invalidating communication style is linked to greater child distress during procedures (Blount et al., 1989; Cline et al., 2006). Therefore, research on parental distress, parent–child communication, and child adjustment across numerous pediatric and at-risk populations highlights the potential importance of maternal distress for mother–child communication and child adjustment in families of children with cancer.

Notably, although there is strong evidence linking maternal distress to mother–child communication, less research has examined relations among maternal

Table I. Demographic Characteristics of Participants

	M	SD
Child age	10.19	3.86
Mother age	37.83	7.82
Mother years of education	17.03	3.98
	<i>N</i> / <i>%</i>	
Child race		
White	81	
Black	12	
Other	7	
Child ethnicity		
Not Hispanic/Latino	93	
Hispanic/Latino	7	
Child cancer diagnosis		
Leukemia	40	
Lymphoma	19	
Brain tumor	6	
Other solid tumor	35	
Annual family income		
<\$25,000	26	
\$25,000–\$50,000	28	
\$50,000–\$75,000	14	
\$75,000–\$100,000	11	
>\$100,000	19	
Mother's marital status		
Partnered	75	
Unpartnered	25	

Note. Partnered = married or living with someone, unpartnered = single, divorced, separated, or widowed.

coping, distress, and communication. Although interpersonal models of coping suggest a direct link between maternal coping and mother–child communication, maternal distress may also partially explain the association between coping and communication. Primary and secondary control coping (which encompass strategies such as problem solving, support seeking, and optimistic thinking) are associated with lower levels of distress in mothers following their children's diagnosis (Compas et al., 2015; Greening & Stoppelbein, 2007; Norberg, Lindblad & Boman, 2005). Therefore, it is possible that higher levels of primary and secondary control coping could promote more positive, and less harsh and withdrawn, maternal communication, not only by enhancing mothers' interpersonal and parenting skills such as warmth and responsiveness, but also by reducing mothers' levels of emotional distress.

Finally, mother–child communication varies based on the child's age and developmental level. Certain aspects of parent–child interaction (e.g., conflict) fluctuate from childhood to early and later adolescence, although overall relationship quality does not change (Laursen, Coy & Collins, 1998; Larson, Richards, Moneta, Holmbeck, & Duckett, 1996). Child age may also impact mothers' reactions to their child's cancer; younger child age is associated with higher maternal stress in these families (Rodriguez et al., 2012;

Streisand, Braniecki, Tercyak, & Kazak, 2001; Vrijmoet-Wiersma et al., 2010). These findings indicate the need to account for the effects of child age when examining maternal distress and communication in families of children with cancer.

The current study examined associations among maternal primary and secondary control coping, maternal depressive symptoms, and mother–child communication (positive, withdrawn, and harsh) in mothers of children with recently diagnosed cancer. We assessed maternal coping and depressive symptoms near the time of the child's diagnosis or relapse, and maternal communication about cancer several months later. This study focuses on primary and secondary control coping, as these are potential targets for interventions to enhance adaptive coping skills. The study builds on previous research in several ways. First, we examine mother–child communication about cancer within a generalized context, whereas most prior research in pediatric cancer has focused on communication in the specific context of medical procedures (Blount et al., 1989; Cline et al., 2006). Second, we use a theoretically based, empirically validated model of coping and assess coping and distress shortly following diagnosis, when primary and secondary control strategies may protect against distress (Compas et al., 2015; Greening & Stoppelbein, 2007; Norberg et al., 2005). Third, we examine whether there are independent associations of coping and distress with subsequent mother–child communication, after accounting for potential effects of child age on communication. Interpersonal models of coping suggest a direct association between coping and interpersonal behaviors (DeLongis & Preece, 2002), but prior research also strongly links maternal distress to both coping and mother–child communication. The current study is novel because it examines the extent to which distress accounts for the association between coping and communication.

We hypothesized that: (a) higher primary and secondary control coping would be correlated with lower levels of maternal harsh and withdrawn communication and higher levels of maternal positive communication; (b) higher depressive symptoms would be correlated with more harsh and withdrawn, and less positive, maternal communication; and (c) maternal depressive symptoms would mediate the relation between mothers' coping and their positive, harsh, and withdrawn communication after accounting for child age.

Method

Participants

Participants included 100 children with cancer and their mothers. Demographic information is summarized in Table I.

Procedure

Mothers and children were recruited from two pediatric oncology centers in the Midwestern and Southern United States. Eligibility requirements included: (a) child 5–17 years of age, (b) at least 1 week post new or relapsed cancer diagnosis at recruitment, (c) receiving treatment through the oncology division at the pediatric centers, and (d) no preexisting developmental disability. Informed consent and assent were obtained from parents and children (ages 5–17 years), and the study was reviewed and approved by institutional review boards at both sites. Families were compensated for their participation.

Families were initially recruited to participate in a larger study of adjustment to pediatric cancer (Compas et al., 2014). Mothers completed information on family demographics and self-reported depressive symptoms and coping and returned the questionnaires an average of 57.6 days ($SD = 32.0$) after the child's initial diagnosis or relapse. Families who completed questionnaires were approached by phone or at the hospital again approximately 3 months later to participate in a parent–child observation. A total of 335 families (87% of eligible families) enrolled in the larger questionnaire study. Of the 335 families who enrolled in the questionnaire study, 258 participated when the observational study was also open for enrollment (i.e., the other 77 families participated before the observational study was opened), and 240 of those 258 families provided complete questionnaire data from mothers and were approached to complete the mother–child observation. Of those 240 families, 111 mother–child dyads (46%) completed an observation, and 100 of those 111 families were included in the present analyses. Reasons for declining the observation included lack of time, not wanting to be videotaped, and lack of interest. Families who completed the observation did not differ from those who declined on child age, race, ethnicity, family income, relapse status, maternal depressive symptoms, or maternal primary control coping, but had higher levels of maternal secondary control coping, $t(223) = -2.24$, $p < .05$. In the current analyses, we excluded six families of children who were recruited following relapsed disease. Because only six families had children with relapsed disease, we did not have a large enough sample to test whether these families differed in significant ways from other families; therefore, we chose to exclude them from the present analyses. We also excluded five families in which mothers' questionnaires were returned later than 5 months postdiagnosis, to limit variability in time since diagnosis. Thus, our final sample in the current study included 100 mother–child dyads.

The mother–child observations occurred at the hospital, following an outpatient appointment or while

the child was hospitalized for treatment. The location of the observations was in a small conference room in the outpatient clinic or in the child's inpatient room. During the observation, mother–child dyads first constructed a tangram puzzle task for 5 minutes as a warm-up task, then subsequently had a conversation about cancer for 15 minutes. For the cancer task, mothers and children were instructed to have a conversation about the child's cancer in whatever way felt natural to them. The observation task was previously validated with a pediatric cancer population (Dunn et al., 2011). Mothers received prompts to help stimulate and guide the conversation if needed (e.g., What have we each learned about cancer and how it is treated? What parts of your cancer and its treatment have been the hardest for each of us?). All prompts were listed on a single card, and mothers were told that they could use the prompts to guide the conversation if they wished, but were not required to use them. The prompts were open-ended and were designed to generate a conversation about the family's experience with cancer, including opportunities for mothers to provide information about cancer (e.g., when discussing the diagnosis and treatment), as well as emotional support (e.g., when discussing the child's emotional responses to the cancer). The current analyses focused on mothers' communication during the cancer discussion.

Measures

Family Demographics

Each mother reported the child's age and race/ethnicity and self-reported age, family income, and highest obtained education level. Child diagnostic status was obtained from medical records.

Coping

Mothers completed a version of the Responses to Stress Questionnaire (RSQ)—Pediatric Cancer version (Connor-Smith, Compas, Wadsworth, Thomsen, & Saltzman, 2000; Miller et al., 2009; Rodriguez et al., 2012). This version of the RSQ is specifically tailored to assess mothers' coping in response to having a child with cancer. The RSQ includes 57 items on which participants indicate on a 4-point scale how much they use various coping methods, from 0 (*not at all*) to 4 (*a lot*), in response to stressful aspects of their child's cancer, including daily/role functioning (e.g., paying bills/family expenses), cancer communication (e.g., talking with my child about cancer), and cancer caregiving (e.g., seeing effects of my child's treatment). Factor analyses of the RSQ have identified three coping factors (Connor-Smith et al., 2000). Primary control engagement coping (i.e., problem solving, emotional expression, emotional modulation) and

secondary control engagement coping (i.e., cognitive restructuring, positive thinking, acceptance, distraction) were used in the current analyses. The RSQ has been shown to have good psychometric properties with adults (Compas et al., 2006; Wadsworth et al., 2005; Wadsworth & Santiago, 2008). Internal consistencies for the current sample were $\alpha = .60$ for primary control coping and $\alpha = .69$ for secondary control coping. Proportion scores were created by dividing the total score for each factor by the total score for the RSQ (Connor-Smith et al., 2000; Osowiecki & Compas, 1998, 1999; Vitaliano, DeWolfe, Maiuro, Russo, & Katon, 1990) and were used in the current analyses to control for potential patterns of responses related to the total number of items endorsed (i.e., a tendency to overendorse items).

Maternal Depressive Symptoms

Mothers completed the Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996), which is composed of 21 items that assess presence and severity of current depressive symptoms. Responses are on a 4-point scale from 0 (*absence of symptom*) to 3 (*severe level of symptom*) and yield an overall mean score. The BDI-II is widely used and has demonstrated excellent reliability and validity (Beck et al., 1996); the internal consistency in the current sample was $\alpha = .93$.

Observed Maternal Communication

The Iowa Family Interaction Rating Scale (IFIRS; Melby & Conger, 2001) is a macro-level system used to code parents' verbal and nonverbal communication from 1 to 9 along different behaviors. In determining the score for each category, the frequency, intensity, and contextual or affective nature of the behavior are taken into consideration. A value of 1 represents the absence of a behavior, while a value of 9 represents the highest level of frequency and intensity of a behavior. This rating scale has been used across studies and the validity of the coding system has been established through both correlational analyses and confirmatory factor analysis (Alderfer et al., 2008; Melby & Conger, 2001). Codes used in the current study (e.g., warmth, hostility) have been associated with self-reports of these constructs in pediatric populations (Alderfer et al., 2008).

The mother-child interaction tasks were coded by a team of trained graduate and undergraduate student research assistants at a single study site. To become a trained coder, research assistants first passed a written test of code definitions and examples with 90% accuracy and reached 80% reliability on previously coded videos. All videos were double coded independently by two research assistants, who then met to discuss and reach consensus. In accordance with the IFIRS manual, when ratings differed by a single point, the

higher score was used. Ratings that differed by more than two points on the 9-point scale were resolved through discussion. In the current study, we created the positive communication composite by summing five maternal codes (warmth, prosocial, listener responsiveness, communication, and child centeredness). Examples of positive communication include supportive statements (e.g., "I'm so proud of you") and physical affection (e.g., a hug). A harsh communication composite was created by summing three maternal codes (hostile, inconsistent discipline, and intrusiveness). Examples of harsh communication include hostile statements (e.g., "You're stupid") and physical intrusiveness (e.g., poking). A withdrawn communication composite was created by summing four maternal codes (neglect/distancing, and reverse-scored listener responsiveness, child monitoring, and quality time). Examples of withdrawn communication include statements or behaviors indicating a lack of interest or awareness in the child's needs or experiences (e.g., "I'm too busy to worry about that"). Code definitions and composite code intraclass correlations and internal consistencies are presented in Table II. These composites were theoretically derived to capture communication styles; similar composites have been used with other pediatric populations (e.g., Lim et al., 2011) and families of children with cancer (Rodriguez et al., 2013).

Statistical Power and Data Analyses

Means and standard deviations were calculated to describe the sample. To examine the hypotheses that coping and depressive symptoms would be correlated with maternal communication, we conducted bivariate correlations among these variables. To examine whether depressive symptoms mediated the relation between maternal coping and communication after accounting for child age, we used the joint significance test (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002; MacKinnon & Fairchild, 2009). This test is preferred for its balance of lower Type 1 error and higher power, relative to other tests of mediation (MacKinnon et al., 2002). To indicate mediation, the joint significance test requires that the relation between the *a* path between the predictor and the mediating variable (in this case, coping and depressive symptoms) and the *b* path between the mediating variable and the outcome after accounting for the predictor (depressive symptoms and communication, after accounting for coping) are both significant (MacKinnon & Fairchild, 2009). To evaluate associations between the predictor and mediator, we examined two regression models in which depressive symptoms were regressed onto either primary or secondary control coping after accounting for child age in Step 1. Then, to assess whether the mediator (depressive symptoms) was significantly associated with

Table II. Communication Composite Codes and Definitions

Composite code	Composite Cronbach's α	Intraclass correlation	Subscales	Definition
Positive	.86	.76	Warmth/support Prosocial	Behavior that conveys affection, concern, or support for the child. Demonstrations of helpfulness, cooperation, sympathy, and respectfulness toward the child.
			Listener responsiveness Child centered	Behavior that acknowledges and validates the child's verbalizations through the use of backchannels and assents. Supportive parental behaviors that encourage mastery, success, pride, effective self-regulatory skills in the child.
Withdrawn	.66	.69	Neglect/ distancing	Behavior that is uncaring, apathetic, uninvolved, ignoring, aloof, unresponsive, self-focused, or otherwise minimizes the amount of time, contact, or effort expended on the child.
			Listener responsiveness (reverse coded)	Behavior that shows interest in, acknowledges, and validates the verbalizations of the child through the use of nonverbal backchannels and verbal assents.
			Child monitoring (reverse coded)	The extent to which the parent knows and pursues information about the child's daily life and daily activities.
			Quality time (reverse coded)	The extent and quality of the parent's involvement in the child's life outside of the immediate setting.
Harsh	.68	.72	Hostility	Hostile, angry, critical, disapproving, and/or rejecting behavior toward the child's behavior, appearance, or state.
			Inconsistent discipline	Inconsistency and failure to follow through on an expected consequence or punishment, as well as failure to maintain and adhere to rules and standards set for the child's behavior.
			Intrusiveness	Intrusive and overcontrolling behaviors (e.g., overmonitoring, interfering with child's autonomy).

Table III. Means, Standard Deviations, and Bivariate Correlations Among Key Study Variables (N = 100)

	Mean (SD)	1	2	3	4	5	6	7
1 Child age	10.2 (3.9)	–						
2 Time since diagnosis	57.6 (32.0)	–.03	–					
3 BDI-II	13.2 (10.0)	–.04	.00	–				
4 Primary control coping	0.21 (.04)	.03	.03	–.59**	–			
5 Secondary control coping	0.28 (.05)	.15	.06	–.71**	.47**	–		
6 Positive communication	32.3 (5.1)	–.24*	.06	–.25*	.24*	.18	–	
7 Withdrawn communication	16.6 (3.3)	.15	–.07	.29**	–.33**	–.26**	–.70**	–
8 Harsh communication	7.5 (3.7)	–.24*	–.07	.35**	–.26**	–.29**	–.44**	.38**

Note. BDI-II = Beck Depression Inventory-II; time since diagnosis = length of time in days from the child's diagnosis/relapse to the mother's return of BDI-II and coping questionnaires.

* $p \leq .05$; ** $p \leq .01$.

the outcome (communication) when the predictor (coping) was in the equation, we calculated six separate multiple regression equations. In each of these equations, child age was entered in Step 1, coping (primary or secondary control) was entered in Step 2 (see Table IV; Step 2a represents the model with primary control as the predictor and Step 2b represents the model with secondary control as the predictor), and depressive symptoms were entered in Step 3. Each equation predicted one of the three types of maternal communication (positive, harsh, withdrawn). With 100 families, power was 0.88 to detect statistical significance for two-tailed correlations of $\geq .30$ with $\alpha = .05$, and 0.87 to detect statistical significance for linear multiple regression of $f^2 \geq 0.15$ with $\alpha = .05$. Analyses were conducted with SPSS version 21.

Results

Preliminary Analyses

Means and standard deviations for all study variables are reported in Table III. Mothers' mean score on the BDI-II ($M = 13.2$, $SD = 10.0$) approached the cutoff score of 14 for the "mild depression" category (Beck et al., 1996), and 38% of mothers scored at or above this cutoff. The mean composite score for the communication codes were $M = 32.3$ (of 45; $SD = 5.1$) for positive communication, $M = 16.6$ (of 36; $SD = 3.3$) for withdrawn communication, and 7.5 (of 27; $SD = 3.7$) for harsh communication. Mean values adjusting for the number of individual codes in the composite (i.e., on the 1–9 scale) yielded an average score of 6.5 for positive communication, 4.2 for withdrawn communication, and 2.5 for harsh communication,

Table IV. Linear Multiple Regression Analyses Predicting Mothers' Positive, Harsh, and Withdrawn Communication (N = 100)

Predictor	Positive communication				Harsh communication				Withdrawn communication			
	β	Adj. R^2	ΔR^2	F	β	Adj. R^2	ΔR^2	F	β	Adj. R^2	ΔR^2	F
Step 1		0.05	0.06*	5.95*		0.05	0.06*	5.87*		0.01	0.02	2.24
Child age	-.24*				-.24*				.15			
Step 2a		0.10	0.06*	6.43**		0.10	0.07**	6.69**		0.12	0.11**	7.45**
Child age	-.25*				-.23*				.16			
PC coping	.25*				-.26**				-.33**			
Step 3a		0.11	0.02	5.14**		0.15	0.05*	6.79**		0.12	0.01	5.53**
Child age	-.25*				-.22*				.16			
PC coping	.14				-.08				-.25*			
BDI-II	-.18				.29*				.15			
Step 2b		0.08	0.04*	5.33**		0.10	0.07**	6.76**		0.09	0.08**	5.62**
Child age	-.27**				-.20*				.19			
SC coping	.21*				-.26**				-.29**			
Step 3b		0.10	0.03	4.64**		0.15	0.05*	6.60**		0.09	0.02	4.38**
Child age	-.26*				-.22*				-.18			
SC coping	.04				-.03				-.16			
BDI-II	-.24				.31*				.18			

Note. Adj. = adjusted; PC = primary control; SC = secondary control; BDI-II = Beck Depression Inventory-II. Steps 2a/3a represent the model with PC coping as a predictor. Steps 2b/3b represent the model with SC coping as a predictor.

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

indicating that on average, maternal communication behaviors were relatively sensitive and responsive to the child, but that occasional distancing/unresponsiveness, and infrequent, low-intensity hostility/intrusiveness (e.g., mild criticism, scowls, frowns) were also present.

Older child age was correlated with lower levels of maternal positive ($r = -.24$, $p < .05$) and harsh ($r = -.24$, $p < .05$) communication. Mothers' primary ($r = -.59$, $p < .01$) and secondary ($r = -.71$, $p < .01$) control coping were both correlated with lower levels of depressive symptoms. Days since diagnosis to the receipt of mothers' questionnaires were not correlated with any study variables (r 's from $-.07$ to $.06$, all p 's $\geq .05$). No significant differences were found on maternal primary control coping, $F(3, 96) = 0.33$, secondary control coping, $F(3, 96) = 0.72$, maternal depressive symptoms, $F(3, 96) = 1.05$, maternal withdrawn communication, $F(3, 96) = 2.75$, or maternal harsh communication, $F(3, 96) = 1.57$, when comparing mothers of children with different diagnosis types (i.e., leukemia, lymphoma, brain tumor, and other solid tumor), all p 's $\geq .05$. However, positive communication differed by diagnosis, $F(3, 96) = 2.87$, $p < .05$, and post hoc Tukey HSD tests indicated that mothers of children with leukemia had higher levels of positive communication than mothers of children with solid tumors. Mothers of boys did not differ from mothers of girls on levels of primary control coping, $t(98) = 0.30$, secondary control coping, $t(98) = 1.52$, depressive symptoms, $t(98) = -0.16$, positive communication, $t(98) = 0.06$, harsh communication, $t(98) = -0.98$, or withdrawn communication, $t(98) = -0.51$, all p 's $\geq .05$.

Correlations Among Maternal Coping, Depressive Symptoms, and Positive, Harsh, and Withdrawn Communication

Results of correlational analyses of maternal coping, depressive symptoms, and communication are shown in Table III and indicate that mothers' self-reports of coping and depressive symptoms were significantly, prospectively correlated with their observed communication behavior. As hypothesized, mothers' higher depressive symptoms were correlated with more withdrawn and harsh communication and less positive communication 3 months later (r 's from $-.25$ to $.35$, p 's $< .05$). Further, mothers' higher primary and secondary control coping were both correlated with lower levels of harsh and withdrawn communication (r 's from $-.26$ to $-.33$, p 's $< .05$), and higher primary control coping was correlated with higher levels of positive communication ($r = .24$, $p < .05$).

Depressive Symptoms as a Mediator of the Relation Between Coping and Communication

Linear multiple regression analyses were conducted to examine the hypothesis that maternal depressive symptoms would mediate relations between maternal coping and mothers' positive, withdrawn, and harsh communication after accounting for child age. First, to examine the relation between coping and depressive symptoms after accounting for child age, we examined two regression models in which we regressed depressive symptoms onto coping (either primary control or secondary control) after controlling for child age. In the model with primary control as a predictor, results indicated that, after accounting for child age in Step 1,

primary control coping was significantly associated with depressive symptoms ($\beta = -.59, p < .001$), and model fit was significant $F(2, 97) = 26.32, p < .001$ and significantly improved from Step 1 to Step 2 ($\Delta R^2 = 0.35, p < .001$). Similarly, in the model with secondary control coping as a predictor, after accounting for child age in Step 1, secondary control coping was significantly associated with depressive symptoms ($\beta = -.72, p < .001$), and model fit was significant $F(2, 97) = 49.51, p < .001$ and significantly improved from Step 1 to Step 2 ($\Delta R^2 = 0.50, p < .001$).

Next, to examine coping and depressive symptoms as independent predictors of mothers' communication, we conducted regression analyses with three steps (see Table IV). Child age was entered at Step 1, coping was entered at Step 2 (in Table IV, Step 2a represents the model with primary control as the predictor and Step 2b represents the model with secondary control as the predictor) and coping and depressive symptoms were entered at Step 3 (Step 3a represents the model with primary control as the predictor; Step 3b represents the model with secondary control as the predictor). At Step 2a, primary control coping was a significant predictor of positive, harsh, and withdrawn communication. Similarly, at Step 2b, secondary control coping was a significant predictor of positive, harsh, and withdrawn communication. All ΔR^2 's were significant from Step 1 to Step 2 (see Table IV). At Step 3a, primary control was a unique predictor of withdrawn communication, but not positive or harsh communication. Depressive symptoms were uniquely predictive of harsh communication, but not positive or withdrawn communication. The only ΔR^2 that was significant from Step 2a to Step 3a was for harsh communication (see Table IV). At Step 3b, secondary control was not uniquely predictive of any type of communication. Depressive symptoms were uniquely predictive of harsh communication, but not positive or withdrawn communication. The only ΔR^2 that was significant from Step 2b to Step 3b was for harsh communication (see Table IV).

We used the test of joint significance (MacKinnon et al., 2002; MacKinnon & Fairchild, 2009) to examine evidence for depressive symptoms as a mediator of the relation between coping and communication. As noted above, the relation between maternal coping and depressive symptoms (the *a* path) was significant for both primary and secondary control coping; however, the relation between depressive symptoms and communication after accounting for coping (the *b* path) was only significant in predicting harsh communication (see Table IV). Therefore, based on the joint significance test, depressive symptoms mediated the relation between coping (both primary and secondary control) and harsh communication, but not the relation between coping and positive or withdrawn communication.

Discussion

The current study examined mothers' primary and secondary control coping and depressive symptoms following their child's cancer diagnosis as possible predictors of subsequent mother-child communication about the child's cancer. It is important to identify early predictors of mother-child communication because maternal communication style is a key factor in children's adjustment to chronic illness (Jaser & Grey, 2010; Lim et al., 2011). As hypothesized, bivariate correlations indicated that higher levels of primary and secondary control coping predicted less withdrawn and harsh communication during communication with their child, and higher primary control coping also predicted more positive communication. Depressive symptoms were positively correlated with withdrawn and harsh communication, and negatively correlated with positive communication. Regression analyses indicated that higher primary and secondary control coping were significantly associated with fewer depressive symptoms after accounting for child age. Further, primary control coping emerged as an independent predictor of maternal withdrawn communication, while depressive symptoms were an independent predictor of harsh communication. Finally, the joint significance test indicated that depressive symptoms mediated the relation between each type of coping and harsh communication. However, some hypotheses received only partial support. We did not find that secondary control coping was an independent predictor of maternal communication, and depressive symptoms did not mediate the relation between primary control coping and withdrawn communication. Finally, we did not find evidence to support the hypotheses that coping or depressive symptoms would independently predict positive communication after accounting for child age.

Our findings imply that greater use of primary control coping directly predicts less withdrawn mother-child communication, suggesting that primary control coping characterizes an adaptive response to the stress of a child's cancer that might reduce risk for subsequent difficulties in mother-child communication. A key component of primary control coping involves controlled, well-regulated emotional expression and modulation, which may prevent mothers from withdrawing while talking about cancer with their children. Because mother-child communication is a key predictor of adjustment in children with chronic illness and other stressors (Conger et al., 1995; Jaser & Grey, 2010; Lim et al., 2011), these results suggest that mothers' primary control coping could be protective for adjustment in children with cancer.

We also found that higher depressive symptoms were an independent predictor of more harsh

communication, and that depressive symptoms mediated the relation between lower levels of primary or secondary control coping and more harsh communication. These findings suggest the possible importance of early screening and intervention for mothers who may be at greater risk for depressive symptoms following their child's diagnosis. Cognitive behavioral interventions, such as those used with caregivers of children with developmental disabilities (Singer, Ethridge, & Aldana, 2007) and chronic pain (Levy et al., 2010), may be effective at enhancing primary control coping skills and preventing or reducing depressive symptoms in mothers of children with cancer.

Finally, we found significant negative associations between child age and maternal positive and harsh communication. These results suggest that mothers may simply "do less" of all coded behaviors (such as physical touch and verbal directions) during these interactions with older children. Indeed, our findings are consistent with evidence that parent-child closeness decreases as children move into adolescence (Laursen & Collins, 2004), even as overall relationship quality is relatively stable. Another possible explanation is that families are more likely to discuss more serious or emotionally distressing topics with older children, leading to fewer positive or harsh maternal behaviors. Future investigations should examine the content of these conversations and identify ways to developmentally tailor interventions for these families, as high-quality parent-child communication may manifest differently at different developmental stages, and older children may also have additional networks for information and support (e.g., the medical team, cancer-related websites, and peers).

The strengths of the current investigation include features of the study design and methods, the novel research question, and the direct implications of our results for intervention. The study used a relatively large, multisite sample of mothers of children with cancer, and assessed coping and distress close to diagnosis, while communication was assessed several months later. Our measure of coping was theoretically based and empirically validated, and by using observational assessments of communication and double coding all observational data, we increased the external validity of our findings. Further, the use of questionnaires to assess maternal coping and distress and the use of direct observations to assess maternal communication avoided problems of shared method variance in the assessment of these constructs, increasing confidence in the associations of coping and distress with communication. The use of a prospective design, which allowed us to test maternal coping and distress as predictors of subsequent patterns of maternal communication, was also an important strength of the study. These strengths

notwithstanding, several limitations provide direction for future research and should be considered. Although the study was prospective, there were only two time points to assess three key variables (i.e., coping, distress, and communication). Thus, the design of the current study limited us from fully testing a mediational model of coping's impact on communication as mediated by depressive symptoms, which would have required assessments of these variables over at least three time points (Cole & Maxwell, 2003). More generally, we were limited in determining the directionality of the effects among variables. In addition, the low internal consistency of measures of certain variables (i.e., coping and withdrawn communication) could have limited our ability to detect significant effects related to coping and withdrawn communication. The observation involved clinic-based data collection, which may have reduced fathers' participation rates and affected behavior during the mother-child interaction. We did not assess the extent of mother-child communication in other contexts (e.g., the home), which may be related to mothers' coping strategies and may have influenced their behavior during the observation task. Additionally, we did not examine the topics of the conversations, which could have varied based on maternal coping or child age, and could have impacted mother-child communication quality. Future investigations would benefit from analyzing the specific topics and content of communication about cancer. Finally, our results may not generalize to racial/ethnic minority and non-English speaking participants, as we were underpowered to examine these group differences. Future studies should seek to generalize findings with more diverse participants and settings.

Despite these limitations, the current study extends previous research on maternal coping with pediatric cancer by examining the relations among primary and secondary control coping, depressive symptoms, and mother-child communication about cancer. Our findings suggest that promoting primary control coping skills and intervening to reduce or prevent depressive symptoms following a child's diagnosis may help mothers communicate more effectively with their children. Ultimately, maternal distress and poor mother-child communication may result in negative adjustment to the disease for children. Indeed, maternal distress is associated with children's poor adjustment following diagnosis and into survivorship (Davis, Parra & Phipps, 2010; Landolt, Ystrom, Sennhauser, Gnehm, & Vollrath, 2012; Robinson, Gerhardt, Vannatta, & Noll, 2007). Improving mothers' coping, distress, and communication soon after diagnosis may help children with cancer and their families reap long-term benefits in adjustment and functioning.

Funding

This work was supported by the National Cancer Institute at the National Institutes of Health (grant number R01CA118332 and Ruth L. Kirschstein National Research Service Award F31CA136284); the Vanderbilt CTSA grant from the National Institutes of Health (grant number 1 UL1 RR024975); a gift from Patricia and Rodes Hart; and intramural funding from The Research Institute at Nationwide Children's Hospital.

Conflicts of interest: None declared.

References

- Alderfer, M. A., Fiese, B. H., Gold, J. I., Cutuli, J. J., Holmbeck, G. N., Goldbeck, L., ... Patterson, J. (2008). Evidence-based assessment in pediatric psychology: Family measures. *Journal of Pediatric Psychology, 33*, 1046–1061.
- Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Beck Depression Inventory Manual* (2nd ed.). San Antonio, TX: The Psychological Corporation.
- Blount, R. L., Corbin, S. M., Sturges, J. W., Wolfe, V. V., Prater, J. M., & James, L. D. (1989). The relationship between adults' behavior and child coping and distress during BMA/LP procedures: A sequential analysis. *Behavior Therapy, 20*(4), 585–601.
- Bodenmann, G., Pihet, S., & Kayser, K. (2006). The relationship between dyadic coping and marital quality: A 2-year longitudinal study. *Journal of Family Psychology, 20*, 485–493.
- Cline, R. J., Harper, F. W., Penner, L. A., Peterson, A. M., Taub, J. W., & Albrecht, T. L. (2006). Parent communication and child pain and distress during painful pediatric cancer treatments. *Social Science and Medicine, 63*, 883–898.
- Cole, D. A., & Maxwell, S. E. (2003). Testing mediational models with longitudinal data: Questions and tips in the use of structural equation modeling. *Journal of abnormal psychology, 112*, 558–577.
- Compas, B. E., Beckjord, E., Agocha, B., Sherman, M. L., Langrock, A., Grossman, C. I., ... Leucken, L. (2006). Measurement of coping and stress responses in women with breast cancer. *Psycho-Oncology, 15*, 1038–1054.
- Compas, B. E., Bemis, H., Gerhardt, C. A., Dunn, M. J., Rodriguez, E. M., Desjardins, L., ... Vannatta, K. (2015, January 26). Mothers and fathers coping with their children's cancer: Individual and interpersonal processes. *Health Psychology*. Advance online publication. <http://dx.doi.org/10.1037/hea0000202>
- Compas, B. E., Connor-Smith, J. K., Saltzman, H., Thomsen, A. H., & Wadsworth, M. E., (2001). Coping with stress during childhood and adolescence: Problems, progress, and potential in theory and research. *Psychological Bulletin, 127*, 87–127.
- Compas, B. E., Desjardins, L., Vannatta, K., Young-Saleme, T., Rodriguez, E. M., Dunn, M., ... Gerhardt, C. A. (2014). Children and adolescents coping with cancer: Self- and parent reports of coping and anxiety/depression. *Health Psychology, 33*(8), 853.
- Compas, B. E., Jaser, S. S., Dunn, M. J., & Rodriguez, E. M. (2012). Coping with chronic illness in childhood and adolescence. *Annual Review of Clinical Psychology, 8*, 455–480.
- Conger, R. D., Patterson, G. R. and Ge, X. (1995). It takes two to replicate: A mediational model for the impact of parents' stress on adolescent adjustment. *Child Development, 66*, 80–97.
- 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 stress responses. *Journal of Consulting and Clinical Psychology, 68*, 976–992.
- Davis, G. L., Parra, G. R., & Phipps, S. (2010). Parental post-traumatic stress symptoms due to childhood cancer and child outcomes: Investigation of the role of child anger regulation. *Children's Health Care, 39*, 173–184.
- DeLongis, A., & Preece, M. (2002). Emotional and relational consequences of coping in stepfamilies. *Marriage and Family Review, 34*, 115–138.
- Dunn, M. J., Rodriguez, E. M., Barnwell, A. S., Grossenbacher, J., Vannatta, K., Gerhardt, C. A., & Compas, B. E. (2012). Posttraumatic stress symptoms in parents of children with cancer within six months of diagnosis. *Health Psychology, 31*, 176–185.
- Dunn, M. J., Rodriguez, E. M., Miller, K. S., Gerhardt, C. A., Vannatta, K., Saylor, M., ... Compas, B. E. (2011). Direct observation of mother-child communication in pediatric cancer: Assessment of verbal and non-verbal behavior and emotion. *Journal of Pediatric Psychology, 36*, 565–575.
- Errázuriz Arellano, P. A., Harvey, E. A., & Thakar, D. A. (2012). A longitudinal study of the relation between depressive symptomatology and parenting practices. *Family Relations, 61*, 271–282.
- Fivush, R., & Sales, J. M. (2006). Coping, attachment, and mother-child narratives of stressful events. *Merrill-Palmer Quarterly, 52*, 125–150.
- Greening, L., & Stoppelbein, L. (2007). Brief report: Pediatric cancer, parental coping style, and risk for depressive, posttraumatic stress, and anxiety symptoms. *Journal of Pediatric Psychology, 32*, 1272–1277.
- Jaser, S. S., & Grey, M. (2010). A pilot study of observed parenting and adjustment in adolescents with type 1 diabetes and their mothers. *Journal of Pediatric Psychology, 35*, 738–747.
- Landolt, M. A., Ystrom, E., Sennhauser, F. H., Gnehm, H. E., & Vollrath, M. E. (2012). The mutual prospective influence of child and parental posttraumatic stress symptoms in pediatric patients. *Journal of Child Psychology and Psychiatry, 53*, 767–774.
- Larson, R. W., Richards, M. H., Moneta, G., Holmbeck, G., & Duckett, E. (1996). Changes in adolescents' daily interactions with their families from ages 10 to 18: Disengagement and transformation. *Developmental Psychology, 32*, 744–754.
- Laursen, B., & Collins, W. A. (2004). Parent-child communication during adolescence. In A. L. Vangelisti (Ed.), *Handbook of family communication* (pp. 333–348). Mahwah, NJ: Erlbaum.
- Laursen, B., Coy, K. C., & Collins, W. A. (1998). Reconsidering changes in parent-child conflict across adolescence: A meta-analysis. *Child Development, 69*, 817–832.
- Leung, D. W., & Slep, A. M. S. (2006). Predicting inept discipline: The role of parental depressive symptoms, anger,

- and attributions. *Journal of Consulting and Clinical Psychology*, 74, 524–534.
- Levy, R. L., Langer, S. L., Walker, L. S., Romano, J. M., Christie, D. L., Youssef, N., . . . Whitehead, W. E. (2010). Cognitive-behavioral therapy for children with functional abdominal pain and their parents decreases pain and other symptoms. *The American Journal of Gastroenterology*, 105, 946–956.
- Lim, J., Wood, B. L., & Miller, B. D. (2008). Maternal depression and parenting in relation to child internalizing symptoms and asthma disease activity. *Journal of Family Psychology*, 22, 264–273.
- Lim, J., Wood, B. L., Miller, B. D., & Simmens, S. J. (2011). Effects of paternal and maternal depressive symptoms on child internalizing symptoms and asthma disease activity: Mediation by interparental negativity and communication. *Journal of Family Psychology*, 25, 137–146.
- MacKinnon, D. P., & Fairchild, A. J. (2009). Current directions in mediation analysis. *Current Directions in Psychological Science*, 18, 16–20.
- MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods*, 7, 83–104.
- Melby, J. N., & Conger, R. D. (2001). The Iowa Family Interaction Rating Scales: Instrument summary. In P. K. Kerig & K. M. Lindahl (Eds.), *Family observational coding systems* (pp. 1–22). Mahwah, NJ: Erlbaum.
- Miller, K. S., Vannatta, K., Compas, B. E., Vasey, M., McGoron, K. D., Salley, C. G., & Gerhardt, C. A., (2009). The role of coping and temperament in the adjustment of children with cancer. *Journal of Pediatric Psychology*, 34(10), 1135–1143.
- Norberg, A. L., Lindblad, F., & Boman, K. K. (2005). Coping strategies in parents of children with cancer. *Social Science and Medicine*, 60, 965–975.
- Oswiecki, D. M., & Compas, B. E. (1998). Psychological adjustment to cancer: Coping and control beliefs in young adult cancer patients. *Cognitive Therapy and Research*, 22, 483–499.
- Oswiecki, 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.
- Pai, A. L., Greenley, R. N., Lewandowski, A., Drotar, D., Youngstrom, E., & Peterson, C. C. (2007). A meta-analytic review of the influence of pediatric cancer on parent and family functioning. *Journal of Family Psychology*, 21, 407–415.
- Robinson, K. E., Gerhardt, C. A., Vannatta, K., & Noll, R. B. (2007). Parent and family factors associated with child adjustment to pediatric cancer. *Journal of Pediatric Psychology*, 32, 400–410.
- Rodriguez, E. M., Dunn, M. J., Zuckerman, T., Hughart, L., Saylor, M. M., Schuele, C. M., . . . Compas, B. E. (2013). Mother-child communication and maternal depressive symptoms in families of children with cancer: Integrating macro- and micro- levels of analysis. *Journal of Pediatric Psychology* 38, 732–743.
- 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.
- Singer, G. H., Ethridge, B. L., & Aldana, S. I. (2007). Primary and secondary effects of parenting and stress management interventions for parents of children with developmental disabilities: A meta-analysis. *Mental Retardation and Developmental Disabilities Research Reviews*, 13, 357–369.
- Smith Bynum, M., & Brody, G. (2005). Coping behaviors, parenting, and perceptions of children's internalizing and externalizing problems in rural African American mothers. *Family Relations*, 54, 58–71.
- Spagrud, L. J., von Baeyer, C. L., Ali, K., Mpofu, C., Fennell, L. P., Friesen, K., & Mitchell, J. (2008). Pain, distress, and adult-child interaction during venipuncture in pediatric oncology: An examination of three types of venous access. *Journal of Pain and Symptom Management*, 36, 173–184.
- Streisand, R., Braniecki, S., Tercyak, K. P., & Kazak, A. E. (2001). Childhood illness-related parenting stress: The pediatric inventory for parents. *Journal of Pediatric Psychology*, 26(3), 155–162.
- Vitaliano, P. P., DeWolfe, D. J., Maiuro, R. D., Russo, J., & Katon, W. (1990). Appraised changeability of a stressor as a modifier of the relationship between coping and depression: A test of the hypothesis of fit. *Journal of Personality and Social Psychology*, 59, 582–592.
- Vrijmoet-Wiersma, C. M., Hoekstra-Weebers, J. E., Margreet de Peinder, W. M. G., Koopman, H. M., Tissing, W. J., Treffers, P. D., . . . Egeler, R. M. (2010). Psychometric qualities of the Dutch version of the Pediatric Inventory for Parents (PIP): A multi-center study. *Psycho-Oncology*, 19(4), 368–375.
- Wadsworth, M. E., Raviv, T., Compas, B. E., & Connor-Smith, J. (2005). Parent and adolescent responses to poverty-related stress: Tests of mediated and moderated coping models. *Journal of Child and Family Studies*, 14, 283–298.
- Wadsworth, M. E., & Santiago, C. D. (2008). Risk and resiliency processes in ethnically diverse families in poverty. *Journal of Family Psychology*, 22, 399–410.
- Weisz, J. R., Francis, S. E., & Bearman, S. K. (2010). Assessing secondary control and its association with youth depression symptoms. *Journal of Abnormal Child Psychology*, 38, 883–893.