

Direct Observation of Mother–Child Communication in Pediatric Cancer: Assessment of Verbal and Non-verbal Behavior and Emotion

Madeleine J. Dunn,¹ MS, Erin M. Rodriguez,¹ MS, Kimberly S. Miller,² MS, Cynthia A. Gerhardt,² PhD, Kathryn Vannatta,² PhD, Megan Saylor,¹ PhD, C. Melanie Scheule,¹ PhD, and Bruce E. Compas,¹ PhD

¹Vanderbilt University and ²The Research Institute, Nationwide Children's Hospital, The Ohio State University

All correspondence concerning this article should be addressed to Bruce E. Compas, PhD, Department of Psychology & Human Development, Vanderbilt University, Peabody 552, 230 Appleton Place, Nashville, TN, 37203, USA. E-mail: bruce.compas@vanderbilt.edu

Received September 2, 2009; revisions received May 25, 2010; accepted June 21, 2010

Objective To examine the acceptability and feasibility of coding observed verbal and nonverbal behavioral and emotional components of mother–child communication among families of children with cancer. **Methods** Mother–child dyads ($N = 33$, children ages 5–17 years) were asked to engage in a videotaped 15-min conversation about the child's cancer. Coding was done using the Iowa Family Interaction Rating Scale (IFIRS). **Results** Acceptability and feasibility of direct observation in this population were partially supported: 58% consented and 81% of those (47% of all eligible dyads) completed the task; trained raters achieved 78% agreement in ratings across codes. The construct validity of the IFIRS was demonstrated by expected associations within and between positive and negative behavioral/emotional code ratings and between mothers' and children's corresponding code ratings. **Conclusions** Direct observation of mother–child communication about childhood cancer has the potential to be an acceptable and feasible method of assessing verbal and nonverbal behavior and emotion in this population.

Key words assessment; cancer; family functioning; oncology.

Introduction

Parents of children with cancer are faced with at least two significant tasks—to provide their children with information about the disease and its treatment and to serve as a significant source of emotional support. For example, when parents of children with cancer were interviewed and asked to describe their perception of their role in relation to their child throughout their experience of cancer and its treatment, all parents qualitatively described the importance of their “being there” for their child, a concept that included providing emotional support, being physically available, developing trust, and advocating for their child (Kars, Duijnste, Pool, van Delden, & Grypdonck, 2008). Providing their child with information and emotional support may be accomplished through verbal and nonverbal

interactions between parents and children. Parents may struggle to gauge the level of detail to share with their child about the diagnosis, treatment, and prognosis, and to choose the words and terms that their child can understand (Clarke, Davies, Jenney, Glaser, & Eiser, 2005). Although parents have consistently reported their own fears, worries, and other emotions in response to their child's cancer (Bruce, 2006; Kazak et al., 2004), they have also reported their sense of the importance of providing emotional support for their child (Kars et al., 2008). Understanding parent–child communication may have important implications for adjustment to cancer and for interventions with families to address problems in adjustment, as communication already plays a significant role in many schools of family therapy and other pediatric psychology interventions (e.g., Wysocki et al., 2008).

Observational coding systems have been used to assess parent–child communication and family functioning with pediatric populations including children with diabetes, asthma, and cystic fibrosis (e.g., DeLambo, Ievers-Landis, Drotar, & Quittner, 2004; Kaczynski, Lindahl, Malik, & Laurenceau, 2006; Miller & Drotar, 2007; Piazza-Waggoner, Modi, Powers, Williams, Dolan, & Patton, 2008). These systems include the Iowa Family Interaction Rating Scale (IFIRS; Melby & Conger, 2001), the System for Coding Interaction and Family Functioning (SCIFF; Lindahl & Malik, 2001), the Interaction Behavior Code (IBC; Prinz, Foster, Kent, & O’Leary, 1979), and the McMaster Interaction Coding System (MICS; Dickstein, Hayden, Schiller, Seifer, & San Antonio, 1994). The current study used the IFIRS, a macro-level coding scheme designed to assess verbal and nonverbal behavioral and emotional components of communication and interaction (Melby & Conger, 2001). The IFIRS is one of five observational measures of family functioning acknowledged as “well-established” for use in pediatric populations (Alderfer et al., 2008).

The IFIRS was selected for this study in order to examine a range of verbal and nonverbal behavioral and emotional components of mother–child communication about cancer as a component of broader family functioning in a wide age range (5–17 years old) of children. The IFIRS is well suited to these goals for several reasons: (1) the IFIRS has been designed and validated with parent–child dyads, including children of a variety of ages (Melby & Conger, 2001), laying a foundation for applying this system to pediatric cancer patients of a wide age range. (2) The IFIRS has been applied to a variety of different types of dyadic interaction tasks, providing support for applying it to the conversational paradigm used here (i.e., participants were asked to discuss a range of cancer-related topics related to the child’s diagnosis and treatment for cancer). (3) The IFIRS utilizes a global rating for each code for each interactor on an incremental scale from 1 to 9 to reflect the overall frequency and intensity of verbal and nonverbal behaviors and emotions exhibited during the conversation (Melby & Conger, 2001), rather than recording a dichotomous decision of whether a behavior did or did not occur. This method allows for parametric statistical analyses and the potential to capture wider ranges of individual differences in parent–child communication. (4) Research examining the construct validity of the IFIRS codes has shown that groups of codes that form theoretical constructs are significantly intercorrelated. For example, a “hostility” construct was formed from the three codes hostility, angry coercion, and antisocial; a “warmth” construct was formed from the codes warmth, prosocial, listener

responsiveness, and quality time (Ge, Best, Conger, & Simons, 1996); and positive mood and warmth/support have been shown to correlate significantly (Jaser, Fear, Reeslund, Champion, Reising, & Compas, 2008). Given that the IFIRS has been validated in the age ranges used in this study and in interactional paradigms similar to the one used in the current study (e.g. Melby & Conger, 2001), and there is support for its psychometric properties of reliability and validity, there is a logical extension here into the population of pediatric cancer patients and their parents.

Previous research in pediatric populations has produced meaningful findings using the IFIRS to code interactions of children with asthma and their parents (Celano, Bakeman, Gaytan, Smith, Koci, & Henderson, 2008; Lim, Wood, & Miller, 2008) and children with cystic fibrosis and their parents (DeLambo, Ievers-Landis, Drotar, & Quittner, 2004). For example, Lim, Wood, and Miller found that IFIRS codes reflecting mothers’ negative parenting behaviors when interacting with their child during an emotional task were related to children’s reports of higher depressive and trait anxiety symptoms as well as higher disease activity, measured by objective counts of asthma symptoms and pulmonary functioning. Although the IFIRS has been rated as well established for use in pediatric populations (Alderfer et al., 2008), this coding scheme has not been applied to children with cancer and their parents. Pediatric cancer presents several unique challenges for the use of observational methods with families, including the unpredictability and intensity of the disease course and treatment (e.g., Currier, Jobe-Shields, & Phipps, 2009), the time constraints families face traveling to and from medical appointments, and the possible reluctance of families to be videotaped discussing this sensitive and important topic with their children. These challenges are likely the reason that observational methods have not yet been explored in this population.

The current study examined the acceptability and feasibility of these methods with children with cancer and their parents. Acceptability has previously been defined as the ability to implement a method, its clinical significance, and the degree to which it is judged to be satisfactory by participants (Kazak et al., 2005; Stehl et al., 2009). Similarly, the current study assessed the acceptability of the method by evaluating the percentage and representativeness of eligible families who consented to the observation task, the percentage who completed the task, and the extent to which adverse effects were identified by researchers and participants (Stehl et al., 2009). Feasibility was defined in the current study by the ability to conduct parent–child observations while children were on

treatment, the time required for coders to reach reliability in the IFIRS, and the level of reliability attained, consistent with a previous definition of feasibility provided by Kazak et al. (2005) that included the ability to use the method and the timeline required to complete the method with families. Feasibility has previously been reported as participant flow through the study, including the time participants took to consent and complete multiple intervention sessions (Stehl et al., 2009). Similarly, feasibility in the current study is conceptualized as elements of the study related to the ability of participants to participate at the specified time as well as personnel resources required to conduct the study. Finally, we explored the construct validity of the IFIRS codes by examining the relations among mothers' and children's verbal and nonverbal behavioral and emotional aspects of communication, including comparing their levels of positive verbal and nonverbal behaviors and emotions to levels of negative ones. We expected that: (1) the methods would be acceptable to participants; (2) the research personnel and time requirements would be feasible and adequate levels of inter-rater reliability would be achieved; and (3) construct validity of the IFIRS as reflected by significant positive correlations among codes assessing positive verbal and nonverbal behaviors and emotions and among codes assessing negative verbal and nonverbal behaviors and emotions; significant negative correlations between codes assessing positive and negative verbal and nonverbal behaviors and emotions; and significant positive correlations between corresponding mother and child codes. Construct validity was further explored by comparing codes of mothers' displays of positive mood, warmth/support, and child centeredness to codes of their displays of sadness, hostility, and neglect/distancing (ND) in order to examine if patterns of differences in mean values were found across codes hypothesized to group together (i.e., positive vs. negative codes).

Method

Participants

Seventy-three children with cancer and their caregivers who participated in a preliminary questionnaire study assessing coping responses and adjustment to the child's cancer were recruited for this parent–child interaction task. Given the preliminary nature of the study, only primary caregivers were recruited, and these were mainly (90%) mothers. The overall participation rate for the umbrella study from which participants for the observations were recruited was 93% ($n = 73$) and 34 of these families completed the interaction task (see Results section for detailed presentation of consenting and participation rates). One

father who was a primary caregiver participated in the interaction; however, because he was the only father, this interaction was excluded from these analyses. Data from 33 mother–child dyads are presented here.

Children ranged in age from 5 to 17 years ($M = 10.3$, $SD = 3.9$) and had a variety of childhood cancer diagnoses, including leukemias ($n = 11$, 30%), lymphomas ($n = 10$, 30%), brain tumors ($n = 4$, 12%), and other solid tumors ($n = 8$, 24%), roughly representative of prevalence rates of different types of childhood cancer (American Cancer Society, 2009). Observed interactions were conducted between 0.5 months and 17 months ($M = 3.14$, $SD = 4.24$, $Mdn = 1.25$) after the child's diagnosis or relapse. At recruitment, 25 (76%) of the children had received their first diagnosis of cancer and 8 (24%) had a relapse of their original cancer. Sixteen (48%) of the children were female. The sample was 81% European American, 13% African-American, and 6% other races; the sample was also 7% Hispanic. Mothers ranged from ages 26 to 53 years old ($M = 37.6$, $SD = 6.2$). With respect to mothers' education, 36% completed high school, 33% some college or trade school, and 24% 4-year college or trade school. Duncan scores of socioeconomic status for the families based on reports of currently held jobs and responsibilities within those jobs (TSEI2; Nakao & Treas, 1992) indicated that, on average, mothers held positions equivalent to administrative assistants and clerks ($M = 34.80$, $SD = 20.40$, $Mdn = 35.03$). The families represented a range of annual income levels: 19% earned less than \$25,000, 34% \$25,001–50,000, 16% \$50,001–75,000, 22% \$75,001–100,000, and 9% over \$100,000.

Measures

Iowa Family Interaction Rating Scale

The IFIRS was used to code the videotaped interactions between mothers and children. The IFIRS is a global observational coding system designed to measure verbal and nonverbal behavioral and emotional aspects of communication and interactions between parent and child (Melby & Conger, 2001). Specific behavioral and emotional aspects of the individuals and their interaction are each assigned a global rating ranging from 1 to 9, where 1 is the absence of the behavior/emotion and 9 represents a behavior/emotion that is "mainly characteristic" of the interactor during the interaction (Melby & Conger, 2001). The final rating for each code is determined by taking into account the frequency, intensity, and proportion of verbal and nonverbal behaviors that the code encompasses (see Table D). For example, an individual rated 1 on Positive Mood displayed "no examples or evidence of Positive Mood;" an individual rated 9 "frequently" was "happy, optimistic, content,

Table 1. *Definitions and Examples of IFIRS Codes Used in these Analyses*

Code	Definition	Examples	Coded for
Positive mood	Smiles, laughs, and positive statements about life and self	“That was fun when we played with our puppy!” Smiling	Mother and child
Sadness	Sad, depressed, and regretful verbal and nonverbal behavior, including frowns, crying, and negative statements about self	“It was really hard when I couldn’t see my friends.” Crying	Mother and child
Warmth/support	Verbal and nonverbal behavior that communicated affection, appreciation, concern, or support for the other	Mom said “I’m really proud of how you handle your chemo treatments;” Child said “I like that you sit with me in the hospital every week.” Holding hands	Mother and child
Hostility	Verbal and nonverbal behavior that expressed anger, disapproving, and/or rejecting behavior toward the other interactor	“You’re being such a pest about the medicine.” “You don’t know what you’re talking about.” Rolling eyes at the other	Mother and child
Child-centeredness	The extent to which a parent displayed sensitivity to and awareness of the child’s needs and timed their actions to be in sync with the child, including sensitivity to the child’s emotions	Child looked uncomfortable and mother said, “Is it hard to talk about this? What’s the hardest part for you?”	Mother only
Neglect/distancing	Parent’s insensitivity, missed opportunities to connect with or empathize with the child, including being uncaring, unresponsive, or dismissive of the child’s feelings and concerns. This code excluded hostility.	Child said “Missing school is the hardest part” and mother responded coolly, “That wasn’t a big deal. I had to quit my job.”	Mother only

positive about self and life in general” during the interaction. The IFIRS has been validated against self, sibling, and parent questionnaire reports (e.g., Melby & Conger, 2001; Melby, Conger, Ge, & Warner, 1995).

Fifteen codes were rated for both children and mothers, and an additional 9 codes were rated for mothers only. The IFIRS organizes its codes for parents into three categories: emotion, dyadic interaction, and parenting. For mothers in the current analyses, a subset of the 24 codes (6) were selected on an a priori basis to represent one positive and one negative code from each IFIRS category: emotion (positive mood, sadness), dyadic interaction (warmth/support, hostility), and parenting (child centeredness, ND). For children, four codes were selected from the applicable categories of emotion and dyadic interaction: emotion (positive mood, sadness) and dyadic interaction (warmth/support, hostility). This subset of codes was chosen here to represent a first step in examining the IFIRS with children with cancer and to reduce Type I errors due to the number of correlations possible among all 24 codes. Definitions and examples of the codes are given in Table 1.

All of the IFIRS coding was completed at one of the participating research sites with a coding team of six coders: three doctoral students and three undergraduate psychology honors students. Coders studied the IFIRS

manual in-depth, passed a written test of coding definitions and conventions with at least 90% correct, and achieved at least 80% reliability on practice tapes that had been previously coded by experienced coders. Weekly training meetings were held in order to prevent coder drift and discuss ongoing questions. Each recorded interaction was independently coded by two trained observers who watched the interaction a total of five times: once to become familiar with the interaction, twice more to code one participant (e.g., the mother), and finally two more times to code the other participant (e.g., the child). The order of coding first the mother or child was determined by a coin flip. Observers then met to compare their ratings. When ratings were within one point of each other, the higher rating was assigned by default. When ratings were discrepant by two or more points, coders discussed the examples that had led to their scoring of that code. The consensus code was then determined by discussion of correct examples and their intensity. In some circumstances, coders or the whole team re-watched the interaction in order to reach a consensus.

Procedure

Mother–child dyads participated at two medical centers in the Southeastern and Midwestern United States. Dyads participated at the hospital, and observations were

conducted in private rooms without interruption that included family consultation rooms in the outpatient clinic (76%) and inpatient rooms (24%). After informed consent and assent were obtained, mothers and children were instructed to have a 15-min conversation based on four prompt questions provided on index cards (e.g., What has made it [cancer] harder to talk about? What do you think will happen next regarding your illness?). The examiner then started the video recorder, which was placed on a collapsible tripod, and left the room. After 15 min the examiner re-entered the room and debriefed the participants to address any lingering questions or distress potentially stimulated by the interaction. Participants were thanked and compensated \$25 for their time and effort. All procedures were approved by the institutional review boards.

Statistical Analysis

The following statistical analyses were performed to examine each study hypothesis. (1) Participant acceptance of the procedure was examined based on the percentage and representativeness of eligible families who consented to the observation task, the percentage who completed the task, and the extent to which adverse effects of the method were identified (Stehl et al., 2009). To examine the representativeness of the sample, independent samples *t*-tests were calculated to compare the 42 mothers who agreed to complete the interaction task to the 31 mothers who declined on self-reported symptoms of depression, anxiety, post-traumatic stress, child age, annual family income, and race/ethnicity. Independent samples *t*-tests were also calculated to compare the children of mothers who agreed to complete the interaction task to the children of mothers who actually completed the interaction on physician's prognostic rating of the child's disease. Any adverse effects reported by mother and child are reported qualitatively.

(2) Feasibility of using observational methods and coding in this particular population was assessed by examining the percentage of children who were on treatment at the time of the observation, the number of staff needed to collect and code observations, the time needed to train staff in IFIRS coding, and the level of reliability attained on the IFIRS (here, inter-rater reliability and distribution properties of the codes). Inter-rater reliability is reported by calculating intraclass correlations (ICCs) for the 10 codes used here, which gives a measure of the degree of absolute agreement between coders. Interpretations of ICC values are as follows: $\leq .40$ good to fair; $.41$ – $.60$ moderate; $.61$ – $.80$ good; $.81$ – 1.00 excellent agreement (Landis & Koch, 1977). Skewness and kurtosis were calculated to examine the distribution properties of the codes. In order to increase the interpretability of skew in the current data set,

standardized skew indices (SSIs; Malgady, 2007) were calculated using the following formula: $SSI = \text{Skew}/2SD^2$. The SSI varies from -1 to 1 with lower and upper bounds representing the extreme values of skewness (Malgady, 2007). Raw kurtosis values reported by the statistical software SPSS between -3 and 3 are generally accepted as within the range of values expected in normal distributions (Maxwell & Delaney, 2004). (3) Pearson correlation coefficients were calculated to examine the construct validity of the IFIRS codes. In order to provide additional information on construct validity, paired samples *t*-tests were calculated to compare codes of mothers' positive versus negative behaviors/emotions (i.e., positive mood vs. sadness, warmth/support vs. hostility, and child centeredness vs. neglect/distancing). Paired samples *t*-tests were also calculated to compare mothers' vs. children's positive mood, sadness, warmth/support, and hostility.

Bonferroni corrections for the significance levels within each "family" of analyses were made by dividing .05 by the number of analyses to derive an adjusted significance level to control for the number of calculations. Power analyses showed that the sample size $n = 33$ produced 80% power to detect $r \geq .55$ at $p = .01$ and $r \geq .47$ at $p = .05$, suggesting that the sample size produced inadequate power to detect small and medium correlations. Although the sample size only produced power to significantly detect correlations of large effect sizes (i.e., $r \geq .37$; Cohen, 1992), correlations of medium ($r = .24$ to $.36$; Cohen, 1992) and large effect size that were not found to be statistically significant are discussed throughout the *Results* section in order to attend to potentially important findings that we were under-powered to detect. Power analyses also showed that the sample size $n = 33$ produced 80% power to detect Cohen's $d \geq 1.3$ at $p = .01$ and Cohen's $d \geq 1.0$ at $p = .05$ for the paired *t*-test comparisons.

Results

Acceptability

Out of 73 families who participated in a preliminary questionnaire study assessing coping responses and adjustment to the child's cancer, 42 families (58%) agreed to participate in the interaction task. Reasons given by families who declined to participate included not being interested, not wanting to dwell on the cancer experience, and not having time. Of the 42 who agreed to participate, 34 parent–child dyads actually completed the interaction (81% of families who agreed; 47% of overall eligible families). Nineteen percent ($n = 8$) of families who agreed to participate did not complete the interaction because they had difficulty

scheduling the interaction at a convenient time or finding a day when the child felt well enough to participate.

The self-report data on all 73 families who participated in the lead-in questionnaire study made it possible to compare families who agreed to participate in the subsequent interaction task to those who declined. Participants in the observation did not differ from non-participants on mothers' mean level of self-reported symptoms of depression, $t(71) = .97$, anxiety, $t(71) = .61$, or post-traumatic stress, $t(71) = .85$, child's internalizing problems, $t(71) = .26$, mean child age, $t(71) = .89$, family socioeconomic status, $t(71) = -.93$, ethnicity, $t(71) = .86$, all t 's *ns*, or race $\chi^2 = 6.5$, *ns*. Despite several participants who could not be scheduled due to their declining health, those who did not complete the observation did not differ from those who did on physician's prognostic rating of the child's disease, $t(71) = -.97$, *ns*. Mothers and children were debriefed after each interaction task and asked their responses to the task; they did not report any undue distress or adverse effects of participation. A subset of mothers and children reported that it was a positive experience during which they learned something meaningful about the other's experience.

Feasibility

All 33 children (100%) were on active treatment for their cancer at the time of participation in the observation and 73% of children participated within 3 months of their diagnosis. This study was conducted at two university medical centers with outpatient and inpatient pediatric hematology/oncology centers. At one medical center, staff needed to recruit participants into the interaction task and complete the interactions included two staff psychologists, one nursing professor, and two doctoral students. At the second medical center, two psychologists, one post-doctoral fellow, and one post-baccalaureate research assistant recruited families and completed the interaction protocol.

Each interaction took approximately 100 min to code, and each tape was double coded. Therefore, each member of the coding team spent approximately 18 hr coding tapes, for a total of 110 hr. Consensus between coders took approximately 20 min per tape, resulting in another 11 hr of effort. Each coder trained for approximately 8–12 weeks, 5–10 hr per week in order to reach reliability with practice tapes. Percentage agreement and inter-rater reliability were calculated between independent coders on the 1 to 9 scale before codes were discussed to reach consensus. Agreement between coders was achieved when independent coders' ratings were either one point discrepant or the same value. Average percentage agreement between coders among the 10 codes rated for the current analyses was 78%. Specifically, independent coders assigned the same numerical rating 33% of the time and ratings were within one point 45% of the time. Of the codes labeled as disagreements, 73% differed by only 2 points (27% differed by more than 2 points). Overall, observers assigned codes within 2 points of one another 94% of the time. ICCs for the 10 codes ranged from .60 to .80 with a mean ICC of .66, corresponding to good agreement (see Table II).

Means and standard deviations of ratings for each code are presented in Table II. Although means for these codes varied considerably from occurring with relatively low frequency in the sample (e.g., ND, $M = 1.85$) to relatively high frequency in the sample (e.g., child centeredness, $M = 6.42$), the standard deviations demonstrated variability within the sample for each code. SSIs are also reported in Table II. All values in the current sample were sufficiently small to interpret non-disruptive levels of skewness, with one exception. Ratings of mothers on ND yielded a high, positive SSI (.41), indicating that scores were clustered near a rating of 1. Given the theoretical importance of this code and the robustness of the t -test and correlation analyses (see below), ND remains in our analyses. Kurtosis values (Table II) are all within acceptable limits, although

Table II. Intra-class Correlations between Raters, Means, Standard Deviations, Skewness, and Kurtosis Values for IFIRS codes for 33 Mother and Child Dyads

IFIRS code	Mothers				Children			
	ICC	<i>M</i> (<i>SD</i>)	SSI	<i>K</i>	ICC	<i>M</i> (<i>SD</i>)	SSI	<i>K</i>
Positive mood	.67	5.67 (1.61)	-.12	-0.32	.80	4.70 (1.74)	.01	-0.52
Sadness	.67	4.27 (1.70)	.04	-0.26	.60	5.30 (1.57)	-.04	-0.79
Warmth/support	.65	5.45 (1.60)	-.05	0.74	.73	2.73 (1.42)	.20	-0.04
Hostility	.64	2.36 (1.51)	.25	0.33	.62	2.58 (1.52)	.24	0.32
Child centeredness	.70	6.42 (1.23)	-.24	0.99	-	-	-	-
Neglect/distancing	.61	1.85 (1.37)	.41	1.76	-	-	-	-

Note. Range of IFIRS codes = 1 to 9; ICC = intraclass correlation; SSI = standardized skew index; K = kurtosis.

the value for mothers' ND suggests a slightly leptokurtic ("too tall") distribution.

Construct Validity of the IFIRS Codes

Bonferroni corrections for this set of correlations were made by setting the family-wise error rate at $p = .05$ and dividing by 15, the number of planned correlations, resulting in a significance level of $p < .003$. Pearson correlations among IFIRS codes for mothers, children, and between mothers and children are presented in Table III. First, with regard to mothers' communication, warmth/support was significantly related to more child-centered parenting, and hostility was significantly related to more ND, both correlations of large magnitude (Cohen, 1992). There were also medium and large, although nonsignificant, correlations between positive mood and warmth/support and positive mood and child centeredness, suggesting that all three of the codes considered to represent mothers' positive verbal and nonverbal behaviors and emotions were inter-correlated with associations at the medium to large effect size. Additionally, there was a correlation of medium magnitude between sadness and hostility, suggesting that the negative codes were also interrelated. Finally, sadness, hostility, and ND, the negative codes, were negatively correlated at the magnitude of medium and large effects with many of the positive codes. Among child codes, only the correlation between children's positive mood and warmth was significant at a large magnitude. There was also a medium, nonsignificant effect for a correlation between sadness and hostility in children, similar to in mothers. Child age was evaluated for its possible role in the construct validity of the IFIRS codes. Child age correlated positively with small to large effect sizes with ratings of

mothers' hostility ($r = .23$) and mothers' ND ($r = .41$). Also, child age correlated negatively with medium to large effects sizes with ratings of mothers' warmth/support ($r = -.35$) and mothers' child centeredness ($r = -.47$).

To further explore construct validity, comparisons among codes were made. Bonferroni corrections for the first set of contrasts were made by setting the family-wise error rate to $p = .05$ and dividing by 5 (the number of planned contrasts) resulting in a significant p value for these comparisons of $p < .01$. Mothers were rated as significantly higher in positive mood than sadness, $t(32) = 3.32, p < .01, d = .85$, higher in warmth/support than in hostility, $t(32) = 6.95, p < .001, d = 1.99$, and higher in child centeredness than ND, $t(32) = 11.98, p < .001, d = 3.51$. Children were rated as displaying similar levels of sadness and positive mood, $t(32) = 1.37, p = .18, d = .36$ and similar levels of warmth/support and hostility, $t(32) = 0.42, p = .68, d = .07$. Bonferroni corrections for the second set of contrasts were made by setting the family-wise error rate at $p = .05$ and dividing by 4, the number of planned contrasts, resulting in a significant p value for these comparisons of $p < .0125$. Paired t -tests showed that mothers were rated as significantly higher than their children in positive mood, $t(32) = 3.42, p < .01, d = .58$ and warmth/support, $t(32) = 9.31, p < .001, d = 1.80$, and significantly lower in sadness, $t(32) = -3.07, p < .01, d = .63$. Ratings of mothers' hostility did not differ from those of their children, $t(32) = -.85, p = .40, d = .15$.

Discussion

The current study explored the acceptability and feasibility of direct observation in children with cancer and their mothers as a method of assessing verbal and nonverbal behavioral and emotional components of communication and the construct validity of the IFIRS codes. Partial support was found for acceptability and feasibility of these methods to assess aspects of communication in this population. Additionally, the construct validity of the IFIRS was supported based on the correlations among positive codes, among negative codes, the negative relations found between positive and negative codes, and the similar patterns of mean differences found across positive versus negative codes from the same category.

Despite the possible importance of parent–child communication when a child has cancer and the important role of parent–child communication in family interventions (e.g., Wysocki et al., 2008), observational methods had not been pursued previously in this population, likely

Table III. Correlations among IFIRS Codes for Mother and Child

	1	2	3	4	5	6	7	8	9
Mother									
Positive mood	–								
Sadness	-.06	–							
Warmth/support	.46 ^a	-.17	–						
Hostility	.04	.26	-.34	–					
Child centeredness	.33	-.28	.57 ^b	-.46 ^a	–				
Neglect/distancing	-.04	.22	-.37	.64 ^b	-.43 ^a	–			
Child									
Positive mood	.53 ^b	.13	.32	.00	.12	-.14			
Sadness	.20	.31	.28	.08	.19	.30	-.17	–	
Warmth/support	.26	.07	.39 ^c	.09	.12	.06	.55 ^b	.16	–
Hostility	.03	.13	-.15	.56 ^b	-.10	.52 ^c	-.11	.25	.00

^aNonsignificant trend ($p < .05$).

^bSignificant after Bonferroni adjustment.

^cNonsignificant trend ($p < .01$).

due to the challenges to acceptability and feasibility of these methods in a population that experiences multiple stressors and presents logistical complications to completing study protocol. Studies that used observational methods with other pediatric populations provide comparison points for acceptability criterion. Lim et al. (2008) reported that 66% of eligible parents and children with asthma agreed to participate in a study involving three data collections, one of which was an observation; of those who agreed, 86% completed the study. In a study that included three direct observations of family mealtimes conducted in the home with families with a child with cystic fibrosis, 47% of eligible families agreed to participate and 93% completed three observations (Janicke, Mitchell, & Stark, 2005). In the current study, participants were recruited from families enrolled in a questionnaire study. This questionnaire study consented 93% of eligible families, comparable to recruitment rates found in other questionnaire studies of this population (e.g., 89%, Patiño-Fernández, Pai, Alderfer, Hwang, Reilly, & Kazak, 2008). For our observation task, 58% of eligible families consented and 81% completed the task (47% of all eligible families). These rates suggest that although a majority of families were willing to participate in a direct observation task, there was a substantial portion of the sample (42% of families approached) who did not find the methodology acceptable. In addition, actually completing that task was too difficult for 19% of families who were interested.

With respect to representativeness, mothers and children who completed the observation in this study did not differ from non-participants on measures of mothers' self-reported symptoms of distress, family demographic variables, or physician's prognostic rating of the child's disease. This lack of differences between participants and non-participants suggests that these methods were acceptable to a representative sample of children with cancer and their parents. The fact that no adverse effects of the method were identified by parents or children and that some dyads described the task as a positive experience provide further partial support for the methodology in this sample. The active phase of treatment may be a key time for capturing differences in emotional distress and adjustment in children with cancer and their families, as previous research suggested that emotional distress in these families typically reaches its peak within the first year of treatment (Sawyer, Antoniou, Toogood, Rice, & Baghurst, 2000). All children in our sample were on treatment, and 73% of children participated within months of their diagnosis, demonstrating that direct observations are feasible to complete close to the time of their child's diagnosis.

The research methods were feasible to complete at two university medical centers with undergraduate, graduate, and professional research staff. The equipment was easily transported between outpatient clinic rooms and inpatient rooms. However, time demands on the staff were increased by having to schedule and set up multiple sessions per one family, since many families had to reschedule their appointments several times. Empirical feasibility of the IFIRS coding method in this population is supported by the fact that a team of six coders were trained in the IFIRS and double-coded the tapes. Although our experience suggests that these research methods were feasible for the staff, the procedures were labor-intensive and required a team of research support at two sites to sustain the effort necessary for clinical contact and coding observations.

Inter-rater reliabilities in the current study provide the first evidence of the feasibility and reliability of the IFIRS in this population. Percentage agreement between two independent raters (78%) and the intraclass correlations (mean ICC = .66) indicated good agreement between coders. The ratings also indicated that these verbal and nonverbal behaviors and emotions occurred with acceptable frequency and variability within the sample (i.e., skewness and kurtosis values of codes were within acceptable limits). The experience of childhood cancer and its treatment can be stressful for children and their parents (Bruce, 2006; Pai et al., 2007), but our findings suggest that high levels of stress do not appear to limit the variability among the verbal and nonverbal behavioral/emotional components of mothers' and children's communication. Although only about half of eligible families completed the task, this participating group was heterogeneous in their communication about cancer. Despite many objective commonalities in the cancer experience among children and their families, we found substantial individual differences in how mothers and children communicate about this sensitive and complex topic.

The current study also found support for the construct validity of the IFIRS codes. These significant relations among positive codes and among negative codes are consistent with earlier findings that showed that IFIRS codes tend to group according to theoretical constructs (e.g., Ge, Best, Conger, & Simons, 1996). In addition, there were similar mean differences found in comparisons between codes of mothers' positive versus negative behaviors/emotions from the same category (i.e., codes indicated mothers consistently displayed more positive vs. negative behaviors/emotions), providing further evidence for general positive and negative constructs within the IFIRS codes. Other studies that have used the IFIRS suggest that the ratings assigned to mothers in our study may have external validity

when compared to ratings of mothers in other populations. For example, Lim et al. (2008) examined children with asthma (ages 7–17 years) and their parents and coded behavior over three 5-min periods. Sums of IFIRS codes over those three periods (i.e., sums of three “1 to 9” ratings) were positive parenting ($M = 10.1$) and negative dyadic interaction ($M = 5.0$). Jaser, Fear, Reeslund, Champion, Reising, and Compas (2008) examined observed sadness in depressed and non-depressed mothers interacting with their children (ages 11–14 years) during two 15-min tasks. Ratings of observed sadness summed across the two tasks were significantly different between groups (i.e., depressed mothers, 8.4; non-depressed mothers, 6.5).

The current study has several limitations. First, our recruitment rate provides only partial support for the acceptability of the method. Better efforts must make the observation methodology as acceptable and convenient as possible to families. Second, our sample size limited our statistical power leading us to draw inferences about relations among variables based on the effect sizes of the correlations in addition to statistical significance; therefore, the current findings need to be replicated and extended in a larger sample. Third, only mothers were examined in these analyses. Primary caregivers were recruited, but only one father who was a primary caregiver chose to participate, making analyses of the father–child interaction impractical for the current study. Future research should recruit and include secondary caregivers and fathers. Fourth, this observation task is limited by factors that may create an unnatural environment, such as the video camera and prompt questions. Since parents and children knew they were being video recorded, these findings may be subject to the effects of social desirability, especially when considering that mothers’ generated more positive than negative behaviors/emotions. Since children presented with similar levels of positive and negative behaviors and emotions, the findings concerning parents’ asymmetrically positive presentation should be interpreted cautiously, as parents may be more likely to succumb to social desirability effects than children. In the future, parents and children should be asked about the validity of the conversation to provide quantitative data on the accuracy of these behavior samples. Despite these issues, the current study has provided some initial support for the acceptability and feasibility of observational methods to understand mother–child communication in families faced with the challenges of a child’s cancer diagnosis and treatment.

The current study suggests that using observational methods may be useful for capturing *in vivo* characteristics of parent–child communication about cancer and exploring how different communication patterns are related to

parent, child, and family functioning. However, the costs of employing such methods must be carefully weighed with the benefits. These methods required a significant investment of personnel time and resources, both in recruiting families and in coding the interactions. Additional research examining the clinical significance of these findings would strengthen the case for using direct observational methods to assess aspects of communication in children with cancer and their parents. If the benefits prove worthy, future studies may consider using multiple coding systems, such as linguistic and language content analyses in addition to the IFIRS, for multiple levels of analyses of communication and interaction. In addition, future interventions that address parent–child communication about cancer may consider the potential clinical significance of these findings about the verbal and nonverbal behaviors and emotions in mothers and children communicating about cancer.

Funding

This research was supported by grant R01CA118332 from the National Cancer Institute, 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.
- American Cancer Society (2009, May 19). *Cancer reference information: What are the types of childhood cancer?* Retrieved from http://www.cancer.org/docroot/CRI/content/CRI_2_4_1X_What_are_the_types_of_childhood_cancers_7.asp.
- Bruce, M. (2006). A systematic and conceptual review of posttraumatic stress in childhood cancer survivors and their parents. *Clinical Psychology Review, 26*, 233–256.
- Celano, M., Bakeman, R., Gaytan, S., Smith, C. O., Koci, A., & Henderson, S. (2008). Caregiver depressive symptoms and observed family interaction in low-income children with persistent asthma. *Family Process, 47*, 7–20.
- Clarke, S., Davies, H., Jenney, M., Glaser, A., & Eiser, C. (2005). Parental communication and children’s

- behavior following diagnosis of childhood leukaemia. *Psycho-oncology*, 14, 274–81.
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112, 155–159.
- Currier, J. M., Jobe-Shields, L. E., & Phipps, S. (2009). Stressful life events and posttraumatic stress symptoms in children with cancer. *Journal of Traumatic Stress*, 22, 28–35.
- DeLambo, K. E., Ievers-Landis, C. E., Drotar, D., & Quittner, A. L. (2004). Association of observed family relationship quality and problem-solving skills with treatment adherence in older children and adolescents with cystic fibrosis. *Journal of Pediatric Psychology*, 29, 343–353.
- Dickstein, S., Hayden, L. C., Schiller, M., Seifer, R., & San Antonio, W. (1994). *The family mealtime interaction coding system*. Unpublished coding manual, Brown University School of Medicine, Providence, RI.
- Ge, X., Best, K. M., Conger, R. D., & Simons, R. L. (1996). Parenting behaviors and the occurrence and co-occurrence of adolescent depressive symptoms and conduct problems. *Developmental Psychology*, 32, 717–731.
- Janicke, D. M., Mitchell, M. J., & Stark, L. J. (2005). Family functioning in school-age children with cystic fibrosis: An observational assessment of family interactions in the mealtime environment. *Journal of Pediatric Psychology*, 30, 179–186.
- Jaser, S. S., Fear, J. M., Reeslund, K. L., Champion, J. E., Reising, M. M., & Compas, B. E. (2008). Maternal sadness and adolescents' responses to stress in offspring of mothers with and without a history of depression. *Journal of Clinical Child and Adolescent Psychology*, 37, 736–746.
- Kaczynski, K. J., Lindahl, K. M., Malik, N. M., & Laurenceau, J. P. (2006). Marital conflict, maternal and paternal parenting, and child adjustment: A test of mediation and moderation. *Journal of Family Psychology*, 20, 199–208.
- Kars, M. C., Duijnste, M. S. H., Pool, A., van Delden, J. J. M., & Grypdonck, M. H. F. (2008). Being there: Parenting the child with acute lymphoblastic leukaemia. *Journal of Clinical Nursing*, 17, 1553–1562.
- Kazak, A. E., Alderfer, M., Rourke, M. T., Simms, S., Streisand, R., & Grossman, J. R. (2004). Posttraumatic stress disorder (PTSD) and posttraumatic stress symptoms (PTSS) in families of adolescent childhood cancer survivors. *Journal of Pediatric Psychology*, 29, 211–219.
- Kazak, A. E., Simms, S., Alderfer, M. A., Rourke, M. T., Crump, T., McClure, K., . . . Reilly, A. (2005). Feasibility and preliminary outcomes from a pilot study of a brief psychological intervention for families of children newly diagnosed with cancer. *Journal of Pediatric Psychology*, 30, 644–655.
- Landis, J. R., & Koch, G. (1977). The measurement of observer agreement for categorical data. *Biometrics*, 33, 159–174.
- 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.
- Lindahl, K. M., & Malik, N. M. (2001). The system for coding interactions and family functioning. In P. Kerig, & K. M. Lindahl (Eds.), *Family observational coding systems: Resources for systemic research* (pp. 77–91). Mahwah, NJ: Erlbaum.
- Malgady, R. G. (2007). How skewed are psychological data? A standardized index of effect size. *Journal of General Psychology*, 134, 355–359.
- Maxwell, S. E., & Delaney, H. D. (2004). *Designing experiments and analyzing data: A model comparison perspective*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Melby, J. N., & Conger, R. D. (2001). The Iowa Family Interaction Rating Scales: Instrument summary. In P. Kerig, & K. Kindahl (Eds.), *Family observational coding systems: Resources for systemic research* (pp. 33–56). Mahwah, NJ: Lawrence Erlbaum Associates.
- Melby, J. N., Conger, R. D., Ge, X., & Warner, T. D. (1995). The use of structural equation modeling in assessing the quality of marital observations. *Journal of Family Psychology*, 9, 280–293.
- Miller, V. A., & Drotar, D. (2007). Decision-making competence and adherence to treatment in adolescents with diabetes. *Journal of Pediatric Psychology*, 32, 178–188.
- Nakao, K., & Treas, J. (1992). *The 1989 socioeconomic index of occupations: Construction from the 1989 occupational prestige scores (General Social Survey Methodological Report No. 74)*. Chicago, IL: University of Chicago, National Opinion Research Center.
- Pai, A. L. H., 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.
- Patiño-Fernández, A. M., Pai, A. L. H., Alderfer, M., Hwang, W. T., Reilly, A., & Kazak, A. E. (2008).

- Acute stress in parents of children newly diagnosed with cancer. *Pediatric Blood & Cancer*, 50, 289–292.
- Piazza-Waggoner, C., Modi, A. C., Powers, S. W., Williams, L. B., Dolan, L. M., & Patton, S. R. (2008). Observational assessment of family functioning in families with children who have Type 1 Diabetes Mellitus. *Journal of Developmental & Behavioral Pediatrics*, 29, 101–105.
- Prinz, R., Foster, S. L., Kent, R. N., & O’Leary, K. D. (1979). Multivariate assessment of conflict in parent-adolescent dyads. *Journal of Applied Behavior Analysis*, 12, 691–700.
- Sawyer, M., Antoniou, G., Toogood, I., Rice, M., & Baghurst, P. (2000). Childhood cancer: A 4-year prospective study of the psychological adjustment of children and parents. *Journal of Pediatric Hematology Oncology*, 22, 214–220.
- Stehl, M. L., Kazak, A. E., Alderfer, M. A., Rodriguez, A., Hwang, W., Pai, A. L. H., . . . Reilly, A. (2009). Conducting a randomized clinical trial of a psychological intervention for parents/caregivers of children with cancer shortly after diagnosis. *Journal of Pediatric Psychology*, 34, 803–16.
- Wysocki, T., Harris, M. A., Buckloh, L. M., Mertlich, D., Lochrie, A. S., Taylor, A., . . . White, N. H. (2008). Randomized, controlled trial of behavioral family systems therapy for diabetes: Maintenance and generalization of effects on parent-adolescent communication. *Behavior Therapy*, 39, 33–46.