

The Child–Adult Medical Procedure Interaction Scale–Revised: An Assessment of Validity¹

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Investigated the validity of the Child–Adult Medical Procedure Interaction Scale–Revised (CAMPIS-R) using multiple concurrent objective and subjective measures of child distress, approach-avoidance behavior, fear, pain, child cooperation, and parents' perceived ability to help their preschool children during routine immunizations. Parents', staffs', and children's behaviors in the treatment room were videotaped and coded. Results indicate that the validity of the CAMPIS-R codes of Child Coping and Distress, Parent Distress Promoting and Coping Promoting, and Staff Distress Promoting and Coping Promoting behavior were supported, with all significant correlations being in the predicted direction. An unanticipated finding was that the child, parent, and staff Neutral behaviors were inversely related to some measures of distress and positively related to some measures of coping. Interobserver reliability was high for each CAMPIS-R code.

KEY WORDS: pain; distress; coping; pediatric; parents; staff; injections; nurses; medical procedures; children.

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Comprehensive assessment is vital for a clear understanding of the social and procedural factors affecting children's coping and distress during acute painful medical procedures. Through pioneering work in the early 1980s (e.g., Jay, Ozolins, Elliott, & Caldwell, 1983; Katz, Kellerman, & Siegel, 1980), valid observational measures provided a means of assessing both the amount and type of distress behaviors displayed by children during acute painful events. Katz et al. (1980) found that younger children exhibited more distress than older children. In their initial study using the Observational Scale of Behavioral Distress (OSBD), Jay et al. (1983) found that behavioral distress was positively correlated with children's anxiety and ratings of anticipated pain. Further, children displayed less distress after repeated bone marrow aspirations (BMAs), although up to 2 years were required for habituation effects.

Despite the benefits associated with the introduction of these and similar measures of children's behavioral distress, the scales share the common shortcoming of being incomplete in their assessment of important variables during children's acute painful medical events. Children's coping and other nondistress behaviors, as well as the behaviors of parents and staff, were ignored. For this reason, Blount and colleagues developed the Child-Adult Medical Procedure Interaction Scale (CAMPIS; Blount et al., 1989). The CAMPIS includes categories for both child and adult behaviors. Each participant, including the child, mother, father, and medical staff is coded separately.

The initial study with the CAMPIS (Blount, et al., 1989) assessed the behaviors of pediatric oncology patients undergoing BMAs and lumbar punctures (LPs), their parent(s), and medical staff. Sequential analyses indicated that adults' distracting comments were often followed by distracting (coping) comments by the children. Additionally, children's distress was most often preceded by adults' reassurance, empathic comments, apologies, criticism, and giving control to the children. Following children's distress, adults most often reassured the children (also see Blount, Smith, & Frank, in press; Bush, Melamed, Sheras, & Greenbaum, 1986; Dahlquist, Power, Cox, & Fernbach, 1994). Also important to note, adults seemed to take cues from each other as to how to interact with other adults and with the children during the procedure.

Using a revised version of the CAMPIS, the CAMPIS-R, Blount, Sturges, and Powers (1990) examined child and adult behaviors by phase of medical procedure. Anticipatory phase distress was associated ($r = .86$) with distress during the BMA. In addition, the types of coping behaviors varied across phases. During the anticipatory phase, children used relatively high levels of distraction (nonprocedural talk and occasionally humor) and low levels of deep breathing. The reverse was true during the painful phases. Additionally, children's use of distraction and breathing, and adults' attempts to distract the children or coach them to breathe, were highly related. Also, adults' behaviors of

distracting or coaching the children to breathe were inversely related to the children's distress.

In another assessment study using the CAMPIS and CAMPIS-R with children undergoing BMAs and LPs (Blount, Landolf-Fritsche, Powers, & Sturges, 1991), subjects were assigned to groups depending on whether the children engaged in high or low proportions of coping behaviors. The results indicated that (a) the parents of high-coping children distracted and coached their children to cope more than did the parents of low-coping children, (b) high-coping children were more likely to cope following adults' distraction and coaching than were the low-coping children, and (c) *both* the high- and low-coping children were more likely to cope following adult distraction and coaching than following any other adult behaviors measured on the CAMPIS-R. Also, all children were more likely to display distress following adult distress-promoting behaviors (reassurance, apologies, empathic statements, criticism, and giving control to the child) than following any other adult statements. Further, children were more likely to cope following either staffs' or parents' distracting interactions or coaching than following any other staffs' or parents' behaviors.

Extending the assessment research by including the metric of rate of the CAMPIS-R codes and children undergoing a different medical procedure, immunizations, Frank, Blount, Smith, Manimala, and Martin (1995) found that 38% of the variance in children's coping behaviors and 55% of the variance in children's distress behaviors could be predicted using parents' and staffs' coping-promoting and distress-promoting behaviors.

The findings from the assessment studies with the CAMPIS/CAMPIS-R reviewed above have been supported in the empirically derived treatment outcome research conducted with both pediatric oncology patients undergoing BMAs and LPs (Blount, Powers, Cotter, Swan, & Free, 1994), injections for chemotherapy (Powers, Blount, Bachanas, Cotter, & Swan, 1993), and with healthy children undergoing immunizations (Blount et al., 1992). The general intervention was to provide training to the children and parents to facilitate their use of distraction prior to the medical procedures and to use a blower, or counting, during the actual painful medical procedure. Further, CAMPIS codes have been used in assessment (e.g., Manne et al., 1992; Manne, Bakeman, Jacobsen, & Redd, 1993) and treatment research (Gonzalez, Routh, & Armstrong, 1993; Manne, Bakeman, Jacobsen, Gorfinkle, & Redd, 1994; Manne et al., 1990) in other laboratories.

Despite the knowledge contributed by studies using the CAMPIS/CAMPIS-R, all of the assessment studies thus far have explicitly examined only associations among the CAMPIS and CAMPIS-R code relationships. There have been no investigations relating the CAMPIS-R to other measures of fear, pain, or coping, thus leaving unanswered many questions about the validity of the instrument.

Therefore, the purpose of this study is to assess the validity of the CAMPIS-R by investigating its association with multiple observational, child self-report, parent report, and staff report measures of coping- and distress-related constructs.

The hypotheses were that the CAMPIS-R Child Coping category would be negatively correlated with other observational measures, as well as with child, parent, and staff reports of distress, fear, and pain. It was predicted that Child Coping would positively correlate with an observational measure of children's approach coping behaviors, as opposed to avoidance coping; parents' rating of their ability to help their child; and with nurses' ratings of child cooperation. Also, CAMPIS-R Child Distress was expected to positively relate to other observational measures, and child, parent, and staff reports of distress, fear, and pain. It was hypothesized that Child Distress would negatively correlate with children's approach behaviors, parents' rating of their ability to help their child, and with nurses' ratings of cooperation. The CAMPIS-R parent code of Coping Promoting, because of its positive associations with CAMPIS coded child Coping in previous investigations, was expected to negatively correlate with observational measures and child, parent, and staff reports of child distress, fear, and pain. It was predicted that parents' Coping Promoting behavior would positively correlate with children's approach behaviors, parents' ratings of their ability to help their child, and with nurses' ratings of child cooperation. Conversely, parents' Distress Promoting behaviors, because of their positive associations with child Distress in previous investigations, were expected to positively relate to observational and child, parent, and staff reports of child distress, fear, and pain, and negatively relate to children's approach behaviors, parents' ratings of their ability to help their child, and with nurses' ratings of child cooperation. Staffs' behaviors were expected to relate to the validity measures in the same way as the parents' behaviors. For the CAMPIS-R child, parent, and staff Neutral behavior codes, few to no significant correlations were expected with the validity measures, as they are viewed as having little to no association with children's coping and distress.

METHOD

Participants

The subjects were 77 children, ages 4–7 years ($M = 6$ years, 2 months, $SD = 8.5$ months), and their mothers who reported to a county health department for immunizations prior to attending public school. The health department served a broad range of families in the catchment district. There were 36 boys and 41 girls. Of the children 67 were Caucasian, 9 were African American, and 1 was from another ethnic group. Informed consent was obtained

from the parents and verbal assent was obtained from the children prior to participation.

Measures

Overview

In addition to the CAMPIS-R, the multiple validity measures included two observational instruments and parent report, staff report, and child self-report measures. The two observational validity measures included one that assessed only distress and one that assessed distress and approach-avoidance behaviors. Children's self-reports of fear and pain, parents' reports of their children's fear and pain, and staffs' reports of the children's distress were viewed as more similar to the CAMPIS-R codes of child Distress and adult Distress Promoting behaviors, than to the other CAMPIS-R codes. Children's approach coping, parents' rating of their ability to help their child, and staffs' rating of cooperation were viewed as more similar to child Coping and adults' Coping Promoting behaviors, than to the other CAMPIS-R codes.

Observational

Three observational measures were used in this investigation. For the CAMPIS-R and the OSBD (Jay & Elliott, 1984; Jay et al., 1983), observation periods included the 3 minutes prior to the medical procedure, the injection, and the 2 minutes following the injection. Observational data were collected using a video camera in the treatment room. Videotapes of the injections were later transcribed and coded using the CAMPIS (Blount et al., 1989). Additionally, transcripts were made in order to increase interrater reliability. The OSBD and the Behavioral Approach-Avoidance and Distress Scale (BAADS; Hubert, Jay, Saltoun, & Hayes, 1988) were coded from videotapes only.

The CAMPIS is a 35-code observational scale. The CAMPIS codes were combined into the 6-code CAMPIS-R (Blount et al., 1990), based upon the results from an earlier study (Blount et al., 1989), as well as on conceptual bases. The CAMPIS-R includes child Coping, Distress, and Neutral behaviors; as well as adult Coping Promoting, Distress Promoting, and Neutral. Child Coping includes the CAMPIS codes of Audible Deep Breathing, Nonprocedural Talk by the Child and Humor by the Child (both forms of distraction), and Making Coping Statements. Child Distress includes Cry, Scream, Verbal Resistance, Request Emotional Support, Verbal Fear, Verbal Pain, Verbal Emotion, and Information Seeking. These Distress codes were partially derived from the work of Jay et al. (1983). Child Neutral behaviors included Child Informs About

your child?" The end points on the 10-cm VAS were *no pain at all* and *most pain possible*. Previous research has supported the reliability and validity of parent and staff VAS ratings of children's pain (see Varni, Blount, Waldron, & Smith, 1995; Varni, Thompson, & Hanson, 1987). After the immunization, the parents were asked, "How able were you to help your child during the medical procedure?" The end points of the scale were *not at all able to help child* and *able to help child significantly*.

Before their injection, children were asked to indicate how afraid they were by selecting from one of five smiling to frowning faces described as ranging from *not at all afraid* to *most fear possible*. After the procedure, children indicated their level of pain during the injection by selecting from one of five faces ranging from *no pain at all* to *most pain possible* (LeBaron & Zeltzer, 1984).

The nurse who administered the injection was asked to indicate how distressed and how cooperative the children were during the injections using 10-cm VASs. The end points were *no distress at all* to *most distress possible* and *not cooperative at all* to *most cooperative possible*, respectively.

Reliability

Reliability was calculated for the CAMPIS-R codes using the formula for Cohen's kappa (1960). Independent reliability coders were used to code the entire transcript for 16 randomly selected subjects (21% of *N*). Kappa was calculated separately for children's, parents', and staffs' behavior for each of the three CAMPIS-R codes. The kappa values were Child Coping = .91; Child Distress = .90; Child Neutral = .72; Parent Coping Promoting = .78; Parent Distress Promoting = .82; Parent Neutral = .65; Staff Coping Promoting = .92; Staff Distress Promoting = .88; and Staff Neutral = .88.

Interrater reliability for the OSBD and the BAADS was also calculated using the formula for Cohen's kappa. The obtained kappa reliability for the OSBD Total Distress Score was .86. For the BAADS, the kappa reliability coefficient for the Approach-Avoidance subscale was .75, while the kappa coefficient for the Distress subscale was .73. According to the guidelines proposed by Fleiss (1981), the obtained kappa values represent good to excellent levels of agreement.

RESULTS

Overview and Approach to Data Analysis

The means and standard deviations for each of the variables used in this investigation are presented in Table I. In overview, the results indicate that all significant associations between the CAMPIS-R codes and the validity measures were in the predicted direction. The only unanticipated findings were the signifi-

Table I. Descriptive Statistics

	<i>M</i>	<i>SD</i>	Minimum	Maximum
Validity measures				
OSBD distress	13.2	17.3	0	76.8
BAADS APP/AV	15.6	3.3	6	22
BAADS distress	10.2	7.7	5	60
Parent fear	41.3	27.8	0	100
Parent pain	52.7	27.4	2	100
Parent help	75.5	23.8	0	100
Staff distress	20.3	29.3	0	100
Staff cooperation	81.1	31.7	0	100
Child fear	2.4	1.7	1	5
Child pain	3.4	1.6	1	5
Proportions of CAMPIS-R codes				
Child coping	.42	.28	0	1.0
Child distress	.49	.31	0	1.0
Child neutral	.09	.16	0	1.0
Parent coping promoting	.26	.14	0	.58
Parent distress promoting	.15	.13	0	.46
Parent neutral	.58	.17	.26	1.0
Staff coping promoting	.25	.13	.03	.52
Staff distress promoting	.12	.07	.02	.33
Staff neutral	.63	.13	.39	.87

cant associations between the various CAMPIS-R Neutral codes and the validity measures. Neither age nor sex were significantly related to the CAMPIS-R codes.

To evaluate the associations between the CAMPIS-R codes and the validity measures, a total of 90 statistical tests were performed. Although a Bonferroni correction was employed to control for Type I error, this procedure can be overly restrictive. An alternative approach, which has been used by others (Manne et al., 1993), is to emphasize patterns of results, statistically significant bivariate correlations, and indicate those correlations that remain significant following Bonferroni correction. In this paper, we have presented all correlations that were significant at the $p \leq .10$ level, even though correlations with $p > .05$ should be considered as trends, and indicated those which remain significant following correction ($r \geq .39$; see Table II). Because all of the significant bivariate correlations, except those for the Neutral codes, are consistent with the hypotheses, they are interpreted without additional qualification.

Child Codes

As predicted, CAMPIS-R Coping was inversely related to OSBD Distress, BAADS Distress, children's ratings of their fear and pain, parents' ratings of their children's fear and pain, and staffs' ratings of distress, and positively

Table II. Correlations Between the CAMPIIS-R and the Validity Measures^a

CAMPIS codes	Observational			Adult report						
	OSBD Distress	BAADS		PARENT			Staff		Child report	
		App/Av	Distress	Fear	Pain	Help	Distress	Cooper	Fear	Pain
Child Coping	-.49 ^d	.42 ^d	-.31 ^c	-.19	-.23 ^b	.25 ^b	-.37 ^d	.37 ^d	-.25 ^b	-.22 ^b
Child Distress	.57 ^d	-.45 ^d	.26 ^b	.23 ^b	.25 ^b	-.30 ^c	.46 ^d	-.38 ^d	.30 ^c	.34 ^c
Child Neutral	-.23 ^b						-.23 ^b			-.25 ^b
Parent Coping Promoting		.19	-.20				-.18	.22 ^b		
Parent Distress Promoting	.64 ^d	-.53 ^d	.33 ^c	.28 ^c	.23 ^b	-.39 ^d	.50 ^d	-.43 ^d		.21
Parent Neutral	-.37 ^d	.24 ^b		-.23 ^b			-.22 ^b		-.19	
Staff Coping Promoting					-.18					
Staff Distress Promoting	.49 ^d	-.39 ^d	.25 ^b	.22 ^b		-.22 ^b	.26 ^b	-.27 ^b	.21	
Staff neutral	-.26 ^b								-.22 ^b	

^aOnly those correlations which were significant at the $p \leq .10$ level are displayed. Correlations of $r \geq .39$ are significant using the Bonferroni correction, with the study-wise error set at $p \leq .05$.

^b $p < .05$.

^c $p < .01$.

^d $p < .001$.

correlated with BAADS Approach-Avoidance scores, parents' rating of their ability to help their child, and staffs' rating of child cooperation. These findings indicate a high degree of validity for CAMPIS-R Coping, as the children who displayed a high proportion of coping behaviors also scored as less distressed, less fearful, and having experienced less pain, and as more approaching, cooperative, and easily helped. CAMPIS-R Distress was positively related to OSBD Distress scores, BAADS Distress, and to all of the parent, staff, and child measures of fear, pain, and distress, and was inversely related to BAADS Approach-Avoidance scores, parents' ratings of their ability to help their child, and staffs' rating of cooperation. This indicates a high degree of validity for the code of CAMPIS-R Distress. Child Neutral was inversely related to OSBD Distress, staffs' rating of distress, and children's ratings of their pain. This indicates that children who engaged in a higher proportion of Neutral behaviors, relative to other behaviors, were observed and rated as less distressed.

Parent Codes

Coping Promoting was positively related to BAADS Approach-Avoidance scores and to staffs' rating of the children's cooperation, and was inversely related to BAADS Distress and to staff's rating of children's distress. Distress Promoting was positively correlated with OSBD Distress and with BAADS Distress, as well as with parents' reports of child fear and pain, staffs' reports of child distress, and children's self-report of their pain, and was inversely related to BAADS Approach-Avoidance scores, parents' rating of their ability to help their child, and staffs' rating of cooperation. This suggests a high degree of validity for the metric of Parent Distress Promoting, as parents who displayed a high proportion of Distress Promoting behaviors also had children who were more distressed, were more fearful and experienced more pain, and were less approaching, less cooperative, and less easily helped. Parent Neutral was inversely related to OSBD Distress, parents' ratings of their children's fear, staffs' ratings of child distress, and children's self-reports of fear. Parent Neutral was also positively related to BAADS Approach-Avoidance scores.

Staff Codes

Staffs' CAMPIS-R Coping Promoting was inversely related to parents' report of their children's pain, thereby providing partial support for the validity of the staff Coping Promoting code. Staffs' Distress Promoting behavior correlated positively with OSBD Distress, BAADS Distress, parents' ratings of their children's fear, staffs' rating of the children's distress, and children's rating of their fear, and was inversely related to BAADS Approach-Avoidance scores, parents'

behaviors, nor were the parents and staff trained in coping-promoting behaviors; and all of the children were healthy. Different results might be found with younger or older children, children receiving more painful and invasive medical treatments, children and adults trained in coping or coping promoting behaviors, or ill children. Further, almost all the research with the CAMPIS-R, particularly the treatment research, has been conducted with children in the 3- to 7-year age range. Because older children and adults have more cognitive resources, and a greater ability to implement internal means of coping, different coping behaviors may be included in the CAMPIS-R categories for the older individuals. Second, ideally the validity of the adult CAMPIS-R codes would be assessed using other measures with similar adult behavior categories. The difficulty is that we are unaware of instruments that tap similar domains of adult behavior as are assessed by the CAMPIS-R. The possible exception to this is the Dyadic Prestressor Interaction Scale (DPIS; Bush et al., 1986). The DPIS has been used to assess adult and child behaviors prior to medical treatments. However, there does not appear to be a high degree of correspondence between the dimensions assessed by it and by the CAMPIS-R. This point highlights the necessity of demonstrating the validity of instruments that assess the domains of adult behavior and child coping, as well as child distress, during children's painful medical experiences.

Finally, there is the knotty conceptual issue in any study of children's coping that extends well beyond the scope of this paper and is only noted here. We have chosen in all of our assessment and treatment research to restrict our categorization of behaviors as coping to those behaviors that have an inverse association with distress. This is not consistent with the approach used by all researchers in this area. Some researchers suggest that crying and screaming could be considered as coping behaviors, albeit unsuccessful ones (e.g., Siegel & Smith, 1991), whereas we clearly define those behaviors as distress. There is also the argument that coping is necessitated by distress. In this case, inverse associations would not necessarily be expected between the two constructs, and, in fact, positive correlations between coping and distress might be found. Whereas arguments might be made that crying in an acute painful medical situation could be considered coping, and while it is no doubt true that distress prompts efforts to cope, defining coping as behaviors that are inconsistent with distress has unique advantages. Specifically, the behaviors that are inconsistent with distress are those that have the greatest clinical significance. In therapeutic programs, children should be trained to engage in those behaviors that are most antagonistic with distress, and not to engage in those behaviors that are positively associated with distress. Obviously, the operational definition of coping might change with the characteristics of the stressor, the child, and other aspects of the environment. However, the focus would remain on effective coping, not on inconsequential or counterproductive efforts to cope.

Future research and clinical work in this area should actively focus not only

on children's distress but also on children's coping behaviors and on the behaviors of parents and staff. Children's acute procedural distress is determined in large part by the use of effective coping strategies and by the behaviors of parents and medical staff. Thus, by further investigating children's coping and adults' behaviors, children's distress may be reduced. An additional direction for future research is to develop more efficiently coded versions of well-validated scales which assess the behaviors of all present in the treatment room. In addition to being useful in clinical practice, such cost-efficient scales might also foster additional research targeting a broad range of variables during children's painful medical procedures. Finally, experimental research manipulating those behaviors considered to be distress promoting or neutral might provide additional insights into what adults should be taught to do, and perhaps not to do, during children's acute painful medical treatments.

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