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Observational Behavioral Coding in the Pediatric Emergency Department: Development of the Emergency Department Child Behavior Coding System

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Abstract

Background: Despite improvements over the past decade, children continue to experience significant pain and distress surrounding invasive procedures in the emergency department (ED). To assess the impact of newly developed interventions, we must create more reliable and valid behavioral assessment tools that have been validated for the unique settings of pediatric EDs.

Objective: This study aimed to create and test the Emergency Department Child Behavior Coding System (ED-CBCS) for the assessment of child distress and nondistress behaviors surrounding pediatric ED procedures.

Methods: Via an iterative process, a multidisciplinary expert panel developed the ED-CBCS, an advanced time-based behavioral coding measure. Inter-rater reliability and concurrent validity were examined using 38 videos of children aged from 2 to 12 years undergoing laceration

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Declaration of competing interest

Zeev N. Kain is the president of the American College of Perioperative Medicine and has served as a consultant for Edwards Lifesciences and Pacira. The remaining authors declare no competing interests.

Supplementary materials

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procedures. Face, Legs, Activity, Cry, Consolability (FLACC) scale scores were used to examine concurrent validity.

Results: The final ED-CBCS included 27 child distress and nondistress behaviors. Time-unit κ values from 0.64 to 0.98 and event alignment κ values from 0.62 to 1.00 indicated good to excellent inter-rater reliability for all but one of the individual codes. ED-CBCS distress ($B = 1.26$; $p < 0.001$) and nondistress behaviors ($B = -0.69$, $p = 0.025$) were independently significantly associated with FLACC scores, indicating concurrent validity.

Conclusions: We developed a psychometrically sound tool tailored for pediatric ED procedures. Future work could use this measure to better identify behavioral targets and test the effects of interventions to relieve pediatric ED pain and distress.

Keywords

behavior; emergency department; measurement; pain; pediatric

Introduction

Each year, millions of children present to the emergency department (ED) for injuries, most will undergo procedures such as laceration repair (1,2). Despite the enactment of American Academy of Pediatrics and American College of Emergency Physicians policies to better manage pediatric procedural pain, children continue to experience considerable pain and distress surrounding invasive procedures in the ED (3–8).

Inadequate management of pain and distress is a significant concern, as data consistently indicate an association between procedural pain and distress and negative clinical outcomes in pediatric patients (9,10). Specifically, higher procedural pain is associated with poorer clinical recovery; future pain experiences; and negative psychological outcomes, including post-traumatic stress symptoms (9,11–13). Child anxiety and distress surrounding medical procedures is also a cause for concern, as distress can interfere with treatment procedures and induce biological stress responses that can contribute to enhanced pain perception and heighten risk for poorer outcomes (14). The link between procedural distress and negative clinical and behavioral recovery has been well established in the pediatric outpatient elective perioperative literature (9,15,16). Recent data from the ED has revealed similar effects, indicating that elevated levels of child distress prior to fracture procedures can result in negative maladaptive behavioral changes after discharge (17).

Understanding children's expression of pain and distress is an essential component of effective pain and distress management surrounding painful procedures (7). Observational behavioral assessment can capture a range of child behaviors and is a commonly used methodology for the study of children's pain and distress during medical procedures. The development of observational behavioral pain and distress measures has been driven in the past by research examining children's distress surrounding surgical, needle, and cancer procedures. This work has led to assessment tools evolving from global pain and distress rating scales, such as the Face, Legs, Activity, Cry, Consolability (FLACC), to discrete behavioral coding measures that quantify a range of child distress behaviors, such as the

Child-Adult Medical Procedure Interaction Scale (CAMPIS) (18,19). Using video data of medical procedures and behavioral coding software (e.g., Observer XT, Noldus Inc., Netherlands) that facilitates continuous second-to-second coding of the timing, duration, and sequence of multiple behaviors at a time, researchers were able to successfully adapt the CAMPIS to other settings, such as the preoperative area (Revised Preoperative CAMPIS [R-PCAMPIS]) and the post-anesthesia care unit (CBCS-P) (20,21).

Compared with previous observational behavioral tools that provide a simple overall behavior score in the ED setting, advanced tools, such as the CBCS-P, can provide superior information, as they are designed to facilitate coding of video data to examine the timing, duration, and rate of a range of co-occurring behaviors during a medical encounter. These data allow a more accurate examination of the effects of events or interventions on level of pain, distress, or coping and identify more optimal points of intervention in the ED setting (22–24).

Although perioperative and ED encounters share some similarities, there are unique contextual differences that may influence children's behavior and expression of pain and distress. First, all of the existing perioperative tools (P-CAMPIS and CBCS-P) were developed for children with low surgical acuity undergoing elective outpatient surgery. Indeed, children undergoing surgery with anesthesia experience anticipatory anxiety in the preoperative area and not pain; in the postoperative area, these children are likely to be sedated and have been given multiple analgesics during the intraoperative course. In contrast, in ED settings, the encounters are unplanned and these children and parents may experience acute pain that likely has not been managed when these children present to the ED for the injury repair.

The objective of the current study was to develop and test an advanced behavioral coding tool for the assessment of child behaviors surrounding ED procedures. The ED-CBCS was developed to facilitate second-to-second, time-based, behavioral coding of video data and to obtain data on the timing, frequency, and duration of child behaviors across ED treatment phases. Ultimately, research using this tool can inform the development and outcomes of ED targeted interventions to improve pain and distress.

Methods

Study Design and Participants

This cross-sectional study was conducted within a level I pediatric trauma center ED in the southwestern United States. Participants included children aged from 2 to 12 years who were admitted to a pediatric ED for a laceration repair and their caregivers. Children with an Emergency Severity Index acuity score of 3–5 and families who were fluent in English were eligible to participate (25). Children were excluded if they were scheduled to be admitted to an inpatient floor after the ED procedure; were being seen for co-occurring psychiatric concerns; were being treated for injuries related to maltreatment; had a cognitive impairment or developmental delay; or had a history of cancer, diabetes, thyroid, or pain-related chronic conditions.

Protocol

Child and caregiver participants were recruited after they had been admitted to the ED during the time they were awaiting placement in an ED procedure room. Caregivers were provided with a Health Insurance Portability and Accountability Act authorization form and an informed consent form. Children aged from 7 to 12 years completed assent forms. After consent, caregivers completed a demographics survey using REDCap, a web-based data capture program, on a digital tablet. Clinical procedures were conducted according to the standard of care.

Child behaviors during the procedure were recorded using high-definition 3.0-MP video cameras, which were installed in ED procedure rooms. To ensure clear visibility of the child throughout their stay, two cameras were strategically placed in each room to obtain multiple angles of the child. Audio and video data were downloaded onto a secure server and then imported into the data coding software. Two research assistants independently coded study video data using Observer XT 16.0 (Noldus Inc.) behavior coding software, which captures data on the timing, frequency, and duration of behavioral codes (more details provided below). All study procedures were approved by the Institutional Review Board.

ED-CBCS Development Process

To guide the development of the ED-CBCS, we compiled a multidisciplinary panel consisting of experts in emergency medicine, pediatric pain, behavioral assessment, and development of advanced behavioral coding tools for pediatric medical procedures. Specifically, the ED-CBCS expert panel included an emergency physician, an ED nurse, a pediatric anesthesiologist, 3 pediatric psychologists, and a psychometrician. As a starting point, the panel reviewed the existing R-PCAMPIS and CBCS-P, as well as the existing literature and an initial set of ED procedure videos (n = 5). The panel met multiple times and subsequently decided which child behavior codes within the R-PCAMPIS and CBCS-P were most relevant for ED procedures. Child behavior codes in the selected ED behaviors were also operationally defined for timed-event sequential coding. Timed-event sequential coding captures information about timing, duration, and sequence of behaviors, so behavior code definitions included a description of when the onset and offset of the behavior should be coded. New behaviors specific to the ED setting were also identified with corresponding operational definitions and examples. Through an iterative process, the panel reviewed and refined the new coding measure. A total of 25 behavior codes from the CBCS-P and R-PCAMPIS were retained, and new ED-specific behaviors not previously included were added. New behaviors not previously captured in other behavior measures included post-procedure impairment talk (i.e., statements reflecting concern about post-discharge functional impairments related to injury) and engagement in soothing behavior (e.g., deep breathing and thumb sucking).

Guided by previous work, the panel also selected and defined four 5-min time segments to capture a range of children’s behavior prior to, during, and after the ED procedure (26,27). The time segments included 1) the first 5 min the child is in the procedure room, 2) 5 min surrounding (i.e., 2 min before and 3 min after) the time at which the child is first physically separated or positioned away from caregiver or positioned or prepped for a

medical procedure, 3) 5 min surrounding the start of the procedure, and 4) 5 min after the end of the procedure. Of note, given that standard of care is to have caregivers remain in the room for the entirety of the procedure, the second time segment represents the period during which the child is first positioned away from the caregiver while the caregiver remains in the room.

A preliminary version of the ED-CBCS was drafted, reviewed, and approved by the expert panel. A team consisting of the first author and two research assistants then used the ED-CBCS to independently code an additional 10 ED procedure videos. The team met weekly to compare results and discuss and resolve any disagreements, modifying code definitions or examples when needed. After members of the expert panel reviewed and approved modifications, subsequent reliability and validity procedures were conducted.

Behavior Coding Process

Coding of child behaviors was facilitated by Noldus Observer XT, version 16.0 (Noldus Inc). Observer XT software allows for second-to-second data coding, which is necessary to conduct timed-event sequential coding and obtain timed-event sequential data (i.e., data on the timing, frequency, and duration of behaviors) (28). In timed-event sequential coding, behavior codes are categorized as state or event codes. State codes include behaviors in which duration is relevant (e.g., cry, nonverbal engage in distraction) and onset and offset times are recorded. Event codes include behaviors such as verbal utterances (e.g., “That hurts”) when frequency, not duration, is a more relevant metric and number of occurrences are recorded. Event behavior codes were considered mutually exclusive and exhaustive and only one code could be assigned to each utterance or event behavior. State behaviors were not mutually exclusive, and two state behaviors could be coded simultaneously. For example, if a child was crying and resisting the procedure, both cry and nonverbal resistance would be coded. A state and event code could be coded simultaneously. For example, if a child uttered “that hurts” while pushing the provider away, verbal pain (event code) would be coded during nonverbal resistance (state code).

Ratings of children’s pain were obtained using the FLACC scale, which is a well-established observational pain assessment measure (18,29). Trained research assistants rated children’s behaviors across the five FLACC categories during the procedure. Total scores range from 0 to 10, with higher scores indicating higher pain.

Data Analyses

Descriptive, inter-rater reliability, and validity analyses were conducted using a new set of videos that were not included in the development procedures. Descriptive analyses were conducted to describe the sample and the frequency, rate, and percentage of behaviors. Inter-rater reliability was examined using both time-unit and event alignment κ statistics, which are recommended for the examination of inter-rater reliability for timed-event sequential data (30). Reliability analyses were conducted using GSEQ, version 5.1 (31). For event alignment κ statistics, GSEQ uses a predetermined algorithm to align codes and examine agreements, omission, and commission errors (30). An event tolerance of 2 s and overlap percentage of 80% was set for event alignment κ analyses (21, 30). Time-unit κ statistics

represent inter-rater agreement in time with a time tolerance of ± 2 s (21, 30). The GSEQ program sets a time window of 2 s forward and backward from a code assigned by one rater and counts an agreement if the same code was counted by the second rater within the time window. Because it is suggested that the true value of κ likely falls between the time-unit and event alignment κ values, both statistics are reported. κ values between 0.40 and 0.59 represented fair agreement, values between 0.60 and 0.75 good agreement, and values > 0.75 excellent agreement (32, 33). Behavior codes were retained for subsequent analyses if time-unit or event alignment κ values were ≥ 0.60. Concurrent validity was assessed by examining correlations among distress and nondistress behavior composites and procedure FLACC scores. The sample size for initial measure review and development (i.e., n = 15) was determined based on our past experience with behavioral instrument development (34, 35). For validity analyses, an *a priori* power analysis conducted using G*power indicated that a sample size of 34 would yield 80% power to detect a moderate effect ($f^2 = 0.25$) for a linear regression with up to three tested predictors at a 0.05 level of significance (34,36). Validity analyses were conducted using SPSS Statistics for Windows, Version 27.0 (IBM Corp., Armonk, NY).

Results

Child behavior data were collected from 38 children aged 2 through 12 years (mean [SD] 5.79 [2.85] years, 13 (34.2%) were female) undergoing laceration repair procedures. Child descriptive data are presented in Table 1.

The final ED-CBCS version included a total of 27 child distress (n = 13) and nondistress (n = 14) behavior codes with corresponding operational definitions and examples (the full ED-CBCS manual is provided in Supplementary Table 1). Table 2 displays the prevalence and descriptives for each behavior code. The most common child distress behaviors as assessed by the ED-CBCS included grimace (76.3%), cry (65.8%), nonverbal resistance (52.6%), verbal resistance (34.2%), and verbal pain (26.3%). The most common child nondistress behaviors included nonverbal engage in distraction (94.7%), verbal engage in distraction (44.7%), nonprocedural talk (42.1%), eating or drinking (28.9%), medical talk (26.3%), information seeking (21.1%), and humor (21.1%).

Reliability Results

Inter-rater reliability of individual state and event codes was assessed across 21 videos. Results of reliability analyses are displayed in Table 3. Overall, most behavior codes had time-unit and event alignment κ values in the good to excellent range (0.60–1.00), with the exception of nonverbal request for support (time-unit $\kappa = 0.50$, event alignment $\kappa = 0.51$). Of note, nonverbal request for support was a low frequency behavior, which can negatively affect κ values. There were no coded instances of guarding, coping statement, post-procedure impairment talk, or nonverbal soothing behavior. Behavior codes with $\kappa <$ 0.60 or those that did not occur were not included in subsequent analyses.

Validity Results

To examine concurrent validity, we examined associations between child distress and nondistress codes and FLACC scores. Consistent with previous observational distress measure literature, codes were combined into empirically derived composites representing child distress and nondistress behavior (as displayed in Table 2) (19,26,37). Prior to creating the composites, state behavior percentages and event behavior rates were converted to *z* scores to standardize the data. Preliminary analyses examining associations between child demographic characteristics, child behaviors, and FLACC indicated that child age was negatively associated with FLACC ($r = -0.49$; $p = 0.002$). There were no other significant associations with child demographic characteristics. As displayed in Table 4, child distress behavior was significantly positively associated with FLACC ($r = 0.81$; $p < 0.001$), demonstrating evidence of concurrent validity. Furthermore, nondistress behavior was negatively associated with FLACC ($r = -0.51$; $p < 0.001$) and with distress behavior ($r = -0.45$; $p = 0.005$). Given the significant negative association between child age and FLACC, subsequent regression analyses were conducted to examine relations among distress and nondistress behaviors and FLACC, controlling for child age. Regression results indicated that, controlling for child age, both distress ($B = 1.26$; $p < 0.001$) and nondistress behaviors ($B = -0.69$; $p = 0.025$) were independently significantly associated with FLACC, and the model containing child behavior accounted for 50.4% of the variance in FLACC ($F_{\Delta} = 27.31$; $p \leq 0.001$).

Discussion

In this study, we developed and tested the ED-CBCS, an advanced child behavior coding instrument for the assessment of child behaviors surrounding pediatric ED procedures. The ED-CBCS is vital to guiding and evaluating tailored interventions to manage children's pain and distress in the ED. A multidisciplinary team guided the development of the ED-CBCS and the final instrument included 27 child distress and nondistress behaviors operationalized for the ED setting. Study results indicate good to excellent inter-rater reliability and initial concurrent validity with the FLACC.

Behavioral observation is an important component of child pain and distress assessment surrounding medical procedures and the advent of behavioral coding scales and software that facilitate timed-event behavioral coding have advanced research on pediatric perioperative pain and distress (19–21,38). Unique characteristics of the ED (e.g., fast-paced, critical care environment) and of children presenting to the ED (e.g., arriving in pain after unexpected injury) collectively contribute to increased pain and distress surrounding ED procedures and present a unique challenge compared with the controlled environment of elective surgery or phlebotomy.

It is important to highlight our methodology in deriving the ED-CBCS. An important first step in developing the ED-CBCS was compiling a multidisciplinary panel of researchers and clinicians to guide measure development. Panel members with expertise in pediatric emergency medicine; pediatric psychology; psychometrics; pediatric pain and medical distress assessment; and timed-based, sequential behavior coding were chosen to offer a range of clinical and methodological expertise relevant to developing a behavior coding

tool specifically for the ED. Panel members decided that compiling and adapting behavioral codes from previously validated preoperative (R-PCAMPIS) and postoperative (CBCS-P) behavioral coding measures designed to collect time-based occurrence and duration of verbal and nonverbal behavioral data would allow for the most comprehensive assessment of child distress and nondistress behavior surrounding ED procedures (20,21). The panel also proposed new behaviors to capture talk about post-procedure impairment and engagement in soothing behavior. Overall, children displayed a range of distress and nondistress behaviors. Cry behaviors, nonverbal resistance, verbal resistance, and verbal pain were the most common distress behaviors and nonverbal and verbal engagement in distraction, nonprocedural talk, and medical talk were the most common nondistress behaviors. The percentages of children displaying nonverbal engagement in distraction, cry behaviors, and nonverbal resistance in this ED sample were higher than percentages seen in data about these behaviors in the perioperative settings (20,21).

Study results support reliability and initial concurrent validity of the adapted ED-CBCS for the assessment of child distress and nondistress behaviors surrounding laceration repair procedures in the ED. Reliability analyses incorporating both time-unit and event alignment κ values indicated mostly good to excellent inter-rater reliability across individual behavior codes. Both the distress and nondistress composites were significantly associated with child FLACC scores in expected directions. Furthermore, results of regression analyses indicated that distress and nondistress behavior composites were independently significantly associated with FLACC scores and accounted for an additional 50.4% of the variance in FLACC scores beyond the effects of child age. Collectively, results provide support for concurrent validity of the ED-CBCS and, given the strong effects of different behaviors on children's procedural pain, findings demonstrate a need for future research to explore factors contributing to both distress and nondistress behaviors to inform targeted interventions.

Limitations

Current results should be considered in light of study limitations. The current sample included only children undergoing laceration repairs, and although other invasive procedures in the ED share similarities with laceration repair procedures, current findings may not generalize to other procedures. Future research that includes larger and more diverse samples is needed to enhance external validity of the current findings. In addition, the ED-CBCS was developed from measures validated in English-speaking samples, and our sample only included English-speaking families and one-half identified as White, which is a limitation of the current study as well as in the broader child medical behavior assessment literature. More work is needed to develop and validate behavioral coding tools for non–English-speaking populations.

Conclusions

We conclude that the development and psychometric testing of the ED-CBCS represents a crucial step toward advancing the development of new interventions and management of children's pain and distress surrounding ED procedures. Informed by a multidisciplinary team with expertise in emergency medicine and behavioral assessment, the ED-CBCS was

developed specifically for pediatric ED procedures and employs more advanced time-based behavioral coding of video data. This tool could be used to facilitate a more comprehensive, sequential examination of children's behaviors surrounding ED procedures to identify behavioral targets, important points of intervention, and test the effects of interventions.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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Article Summary

Why is this topic important?

Despite improvements over the past decade, children continue to experience significant pain and distress surrounding invasive procedures in the emergency department (ED). To assess the impact of newly developed interventions, we must develop more reliable and valid behavioral assessment tools that have been validated for the unique pediatric ED setting.

What does this study attempt to show?

Informed by a multidisciplinary team with expertise in emergency medicine and behavioral assessment, this study details the development and testing of an observational behavioral coding tool (Emergency Department Child Behavior Coding System [ED-CBCS]) for the assessment of child pain, distress, and nondistress behaviors surrounding pediatric ED procedures.

What are the key findings?

The ED-CBCS included 27 child pain, distress, and nondistress behaviors operationally defined for the ED setting. Study results indicated good to excellent inter-rater reliability and concurrent validity of the ED-CBCS.

How is patient care impacted?

The development and validation of the ED-CBCS represents a crucial step toward advancing the assessment and management of children's pain and distress surrounding ED procedures. Through the use of more advanced time-based behavioral coding of video data, the ED-CBCS may identify important points of intervention and improve evaluation of distress relief interventions.

Table 1.

Sample Descriptive Characteristics

Variable	Data
Child age (years), mean (SD)	5.79 (2.85)
Child gender,* n (%)	
Female	13 (34.2)
Male	25 (65.8)
Child ethnicity, n (%)	
Latinx	20 (52.6)
Non-Latinx	17 (44.7)
Child race, n (%)	
African American, Black	1 (2.6)
Asian, Pacific Islander	2 (5.3)
Hawaiian or Pacific Islander	2 (5.3)
White	20 (52.6)
Multiracial or other	8 (21.1)
Missing	5 (13.2)
Emergency severity rating, n (%)	
4	36 (94.7)
5	2 (5.3)
Laceration location, n (%)	
Head or neck	31 (81.5)
Upper extremity	4 (10.5)
Lower extremity	3 (7.9)

Table 2.

Behavior Frequency, Rates and Percentages

Behavior Code	Code Type	Displaying Behavior, n (%)	Total Occurrences, n	Percentage or Rate	
				Median	Range
Distress behaviors					
Grimace/facial sign of distress	S	29 (76.3)	20	1.43	0.00–10.13
Cry	S	25 (65.8)	35	3.20	0.00–49.21
Nonverbal resistance	S	20 (52.6)	18	0.09	0.00–13.43
Verbal resistance	E	13 (34.2)	18	0.00	0.00–4.65
Verbal pain	E	10 (26.3)	21	0.05	0.00–1.20
Scream	S	10 (26.3)	20	0.00	0.00–29.07
Informs negative physical status	E	7 (18.4)	20	0.05	0.00–0.45
Nonverbal request for support	E	3 (8.0)	8	0.00	0.00–0.16
Negative verbal emotion	E	2 (5.3)	7	0.00	0.00–0.11
Verbal request for support	E	2 (5.3)	6	0.00	0.00–0.46
Verbal fear	E	1 (2.6)	2	0.00	0.00–0.05
Guarding	S	0	0	—	—
Post-procedure impairment talk	E	0	0	—	—
Nondistress behaviors					
Nonverbal engage in distraction	S	36 (94.7)	61	39.71	0.00–78.76
Verbal engage in distraction	E	17 (44.7)	27	0.19	0.00–2.35
Nonprocedural talk	E	16 (42.1)	26	0.15	0.00–2.50
Eating/drinking	S	11 (28.9)	8	0.00	0.00–5.59
Medical talk	E	10 (26.3)	25	0.05	0.00–0.85
Information seeking	E	9 (23.7)	27	0.10	0.00–1.00
Informs neutral/positive physical status	E	8 (21.1)	24	0.05	0.00–0.47
Humor	E	8 (21.1)	16	0.00	0.00–0.74
Food/drink talk	E	6 (15.8)	17	0.00	0.00–0.37
Home talk	E	6 (15.8)	10	0.00	0.00–0.85
Positive affect about procedure	E	3 (7.9)	7	0.00	0.00–0.15
Medical reinterpretation/play	E	3 (7.9)	5	0.00	0.00–0.20

Behavior Code	Code Type	Displaying Behavior, n (%)	Total Occurrences, n	Percentage or Rate	
				Median	Range
Holding security object	S	0	0	—	—
Soothing behavior	S	0	0	—	—
Coping statement	E	0	0	—	—

E = event behavior; S = state behavior.

Table 3.

Inter-Rater Reliability

Behavior Code	Code Type	Time Unit, κ (Maximum)*	Event Alignment, κ (Maximum)*
Distress behavior			
Cry	S	0.98 (0.98)	0.91 (0.91)
Grimace/facial sign of distress	S	0.85 (0.85)	0.79 (0.79)
Scream	S	0.97 (0.97)	1.00 (1.00)
Guarding†	S	—	—
Informs negative physical status	E	0.84 (0.85)	0.67 (0.98)
Negative verbal emotion	E	0.75 (0.86)	0.71 (0.90)
Nonverbal request for support†	E	0.50 (1.00)	0.51 (0.51)
Nonverbal resistance	S	0.67 (0.77)	0.60 (0.80)
Post-procedure impairment talk†	E	—	—
Verbal fear	E	0.67 (0.67)	0.64 (1.00)
Verbal pain	E	0.96 (0.96)	0.87 (0.99)
Verbal request for support	E	0.86 (1.00)	0.84 (0.84)
Verbal resistance	E	0.98 (0.99)	0.91 (0.97)
Nondistress behavior			
Coping statement†	E	—	—
Food/drink talk	E	0.82 (0.93)	0.72 (0.85)
Holding secure object†	S	—	—
Home talk	E	0.64 (0.76)	0.52 (0.80)
Humor	E	0.89 (0.92)	0.71 (0.97)
Information seeking	E	0.94 (0.94)	0.70 (0.92)
Informs neutral/positive physical status	E	0.80 (0.89)	0.66 (0.85)
Medical reinterpretation/play	E	0.67 (0.80)	0.66 (0.89)
Medical talk	E	0.87 (0.89)	0.69 (0.93)
Nonverbal engage in distraction	S	0.97 (0.98)	0.96 (0.97)
Nonprocedural talk	E	0.90 (0.96)	0.78 (0.91)
Positive affect about procedure	E	0.77 (0.77)	0.62 (0.94)

Behavior Code	Code Type	Time Unit, κ (Maximum)*	Event Alignment, κ (Maximum)*
Soothing behavior†	S	—	—
Verbal engage in distraction	E	0.92 (0.96)	0.77 (0.94)

E = event behavior; S = state behavior.

*Maximum represents the maximum κ value attainable given the number of codes and distribution. Actual κ values should be interpreted in relation to maximum κ rather than 1.

†Not included in subsequent analyses due to poor reliability or nonoccurrence.

Table 4.

Correlations among FLACC Scores and Child Behaviors

Variable	FLACC	Distress
Distress behaviors	0.81*	—
Nondistress behaviors	−0.51*	−0.45*

FLACC = Face, Legs, Activity, Cry, Consolability.

*$p < 0.01$.