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Lindsey L. Cohen
Georgia State University, llcohen@gsu.edu

Rebecca S. Bernard

Catherine B. McClellan

Jill E. MacLaren

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Assessing Medical Room Behavior during Infants' Painful Procedures: The Measure of Adult and Infant Soothing and Distress (MAISD)

Lindsey L. Cohen, Ph.D.

Georgia State University

Rebecca S. Bernard, Ph.D.

Stanford University

Catherine B. McClellan, Ph.D.

University of South Carolina

Jill E. MacLaren, M.A.

West Virginia University

Abstract

This study evaluated the Measure of Adult and Infant Soothing and Distress (MAISD) for examining infant, parent, and nurse behavior during infants' immunizations. Videotapes of 62 infants, parents, and nurses during immunizations were coded. Concurrent validity and reliability for the MAISD were demonstrated. The scale revealed that infants displayed predominately distress, and adults exhibited primarily reassurance. Parents' and nurses' distractions were positively related to infants' engaging in distraction, and parents' and nurses' reassurance was positively associated with infant distress. There appear to be avenues in which to intervene to teach parents and nurses how to best behave to help infants during their painful medical events.

Key words: infant, procedural pain, distress, distraction, immunization

Assessing Medical Room Behavior during Infants' Painful Procedures: The Measure of Adult and Infant Soothing and Distress (MAISD)

Soon after being born, infants face a number of painful medical events including heel sticks, eye ointment application, and injections. Before the age of 4 years, infants and toddlers will receive roughly 2-4 injections on 5 separate medical visits. Although these invasive procedures are a regular and accepted part of preventative health care practice, it is surprising that there is little effort to decrease the associated pain and distress. In fact, infant medical pain has been understudied and undertreated for years (Alexander & Manno, 2003; Anand & Craig, 1996), especially routine outpatient procedures (Porter, Wolf, Gold, Lotsoff, & Miller, 1997).

The paucity of attention to infant pain might be due to several factors. For instance, Derbyshire (1999) argues that the immature nervous systems of infants buffer some of the perceptions of pain. However, researchers have countered that infants experience pain as intensely, if not more intensely, than their older counterparts (e.g., Anand, 1998). A second debate revolves around whether early painful events impact pain and distress during later procedures. It has been suggested that infants cannot recall early painful experiences, and therefore are not negatively affected by this exposure (Swafford & Allen, 1968; Zimmerman & Torrey, 1965), whereas others retort that early pain can sensitize the infants to heightened later pain experience (e.g., Porter, Grunau, & Anand, 1999; Ruda, Ling, Hohmann, Peng, & Tachibana, 2000; Taddio, Katz, Ilersich, & Koren, 1997).

A practical reason for the minimal infant pain research is that verbal self-report is unavailable with this population. Despite this barrier, researchers are beginning to make great strides in developing alternate ways to quantify infants' distress, such as using physiological

indices (for a review, see Finley & McGrath, 1998). However, good observational scales of infant pain are still lacking in the field. An advantage of behavioral measures is that they provide rich data, which is especially important when examining a complex and subjective event (Blount, Piira, & Cohen, 2003).

Study of pain in preschoolers using observational scales has resulted in significant advances in understanding and treating young children's medical pain and distress. The battery of well-established observational scales for preschoolers and older children undergoing painful medical events include the Procedural Behavioral Rating Scale (PBRS; Katz, Kellerman, & Seigel, 1980), the Observational Scale of Behavioral Distress (OSBD; Elliott, Jay, & Woody, 1987), and the Child-Adult Medical Procedure Interaction Scale (CAMPIS; Blount et al., 1989). These measures have shown that certain adult behaviors seem to help preschoolers with distressing events, whereas others might exacerbate children's reactions. Specifically, correlational studies have revealed that adult distraction and commands to use coping are associated with low child distress; whereas, adult criticism, reassurance, apologizing, providing information during the procedure, and giving the child control over when to begin the procedure are associated with high child distress (e.g., Blount et al.; Jacobsen et al., 1990; Manne et al., 1992). Building on these correlations, experimental work has revealed that training parents and nurses in distraction techniques reduces child distress (e.g., Cohen, Blount, & Panopoulos, 1997; Manne et al., 1990; Powers, Blount, Bachanas, Cotter, & Swan, 1993), and that parent reassurance might cause elevations in child distress (Manimala, Blount, & Cohen, 2000).

Although the observational assessment work focusing on preschoolers has resulted in clear clinical recommendations about optimal nurse and parent behavior for painful pediatric

procedures in this population, there are few studies evaluating relations between adult behavior and infant medical distress. In fact, only three studies to date have explored this area. The first of these studies found that parents exhibited distraction, soothing, and several other behaviors. This is apparently the first descriptive account of mothers' behavior during infants' procedures. Although the authors noted that maternal behavior could be related to infant's distress reactions, they did not examine this in their study (Craig, McMahon, Morison, & Zaskow, 1984).

In the second investigation, relations between maternal soothing behavior and infant immunization distress were conducted using a longitudinal 2-study design (Lewis & Ramsay, 1999). In the first study, maternal soothing, as a single code, was scored using a scale of none, low, moderate, or high. In the second study, 23 maternal soothing behaviors were coded, such as rock, kiss, pacifier, and distraction with an object. The authors totaled all adult soothing behavior when conducting correlational analyses with infant distress. In other words, the quantity rather than quality of parent behavior was examined. Results indicated that there were no relations between adult behavior and infant distress. However, it is not clear whether some behavior (e.g., distraction) might positively correlate with infant distress, and other behavior (e.g., reassurance) negatively correlate with infant distress, as has been found in preschool populations (e.g., Blount et al., 1989).

The third of these studies attempted to extend the work with preschoolers to infants by using the CAMPIS-R (Blount et al., 1997), a scale specifically designed to assess adult and child verbal behavior during medical procedures (Sweet & McGrath, 1998). Consistent with the preschool pain literature, the authors found that mothers' CAMPIS-R Distress Promoting behavior positively correlated with infant distress and nurses' Coping Promoting behavior

negatively associated with infant distress. These findings provide initial support for the idea that parent-child procedure interactions might be similar to parent-infant procedure interactions. However, the CAMPIS-R might have been an inappropriate scale to use in the study. Specifically, the original CAMPIS scale was designed to code the adult and child *verbal* behaviors. Thus, the CAMPIS-R codes of Coping Promoting and Distress Promoting are based on correlations found with verbal children and their parents. Assuming that young infants do not express their distress verbally, and assuming that parents of infants use other means (e.g., rocking, nursing) than verbal ones to soothe infants, the CAMPIS codes and CAMPIS-R codes might have missed critical behaviors exhibited by infants and their parents.

Given that there is no adequate behavioral scale available to examine the array of unique behaviors exhibited by infants, their caregivers, and the nursing staff during pediatric painful procedures, the primary aim of this study was to develop and validate such a scale. In this endeavor, the scale was created with the hopes that its use would guide pediatric procedural pain management interventions. In other words, the treatment utility of the assessment was of paramount interest (see Hayes, Nelson, & Jarrett, 1987 and Nelson-Gray, 2003). The second objective was to use the scale to build on and expand the knowledge concerning variables associated with infant distress by identifying common infant procedural distress behavior, describing parents' and nurses' behaviors used to soothe distressed infants, and evaluate any relations between these variables. As has been found with older children (e.g., Cohen et al., 1997), it was expected that adult distraction would negatively correlate with infant distress, and adult reassurance would positively correlate with infant distress.

Methods

Study Sites and Participants

Two health care facilities located in the Northwestern United States participated in the current study. Both sites were located in small rural towns, and were approximately 10 miles apart. At both sites, the same researchers interacted with families for data collection, and all procedures were the same. Infants who were chronically ill, receiving medications that might have affected pain response, or receiving non-standard immunizations were excluded from the study.

A total of 62 infants, 31 girls and 31 boys, between the ages of 0.13 and 1.86 years (M = 0.88 years; SD = 0.37) participated. The caregivers consisted of 50 mothers and 12 fathers ranging in age from 20.19 to 44.40 years (M = 28.90; SD = 5.33). Families were predominantly Caucasian, accounting for 75.7% of the sample, followed by Asian families, 8.1%, Hispanic families, 8.1%, and 8.1% of the families choose to leave this question blank. The sample was predominately middle class, with 15.2% reporting income ranging from 0-$10,000, 18.2% reporting income ranging from $10-15,000, 18.2% reporting income ranging from $15-25,000, 18.2% reporting income ranging from $25-40,000, 7.6% reporting income ranging from $40-60,000, 12.1% reporting income ranging from $60-10,0000, 2.9% reporting income above $100,000, and 7.6% declining to report their income level.

Measures

History Interview. All parents completed a questionnaire designed to obtain demographic information and basic medical background information including parent's age, gender, race, relation to child, education level, and total family income; and child's age, gender, and race. The

basic medical background information included questions concerning the number of previous visits to this health clinic, any problems that the mother may have experienced during her pregnancy with the child, whether the child was currently on any medication or developmentally delayed, and any major medical problems that the child had experienced.

Validity measures. In order to validate several of the behavioral codes of the Measure of Adult and Infant Soothing and Distress (MAISD), parents and nurses provided ratings of infant pain. Immediately following the immunizations, parents and nurses responded to the following query: "How much did the shots hurt this child?" Responses were made using visual analog scales (VASs), which consisted of 100mm horizontal lines anchored at the extremes with "Not Painful" and "Very Painful."

The Modified Behavior Pain Scale (MBPS; Taddio, Nulman, Goldbach, & Ipp, 1994) provided an additional measure of overt pain response. The MBPS was developed to evaluate infant injection pain, and has good validity and reliability (Taddio, Nulman, Koren, Stevens, & Koren, 1995). Specifically, in a study of the psychometrics of the measure, Taddio et al. (1995) demonstrated concurrent validity correlation coefficients with observer VAS scores ranging from .68 to .74, internal consistency correlation coefficient ranging from .48 to .67, interrater agreement correlations ranging from .83 to .96, and test-retest reliability correlation was .95 (all ps $< .001$).

In the current project, coders were trained on the MBPS using videotapes from other datasets until 98% agreement was obtained. In accord with MBPS protocol, the coders scored 0, 1, 2, or 3 for 'Facial expression' and 'Movements' or 0, 2, 3, or 4 for 'Cry' for a given 10-second interval. For example, a score of 0 on 'Facial expression' corresponds to 'definite positive

expression/smiling' whereas a score of 3 indicates 'Definite negative expression; that is, furrowed brows, eyes closed tightly, brow bulge, naso-labial furrow, open lips; with or without reddened face.' Given findings of high internal consistency of these 3 domains, Facial expression, Movements, and Cry were averaged (Taddio et al., 1995). Consistent with coding in prior studies (e.g., Cohen, 2002), coding was divided into four 10 s phases: baseline (20 s until 10 s prior to injection), anticipatory (10 s prior to injection until injection), injection (injection until 10 s later), and recovery (20 s following the final injection until 10 s later). To minimize the number of analyses, phases were collapsed and an averaged MBPS total score was used, which ranged from 0 (minimum distress) to 3.33 (maximum distress). Interrater reliability was calculated with Cohen's kappa for 18 randomly selected participants and kappas were as follows: MBPS Facial expression, .61; MBPS Cry, .77; and MBPS Movements, .67. These scores represent good (.61 and .67) to excellent (.77) levels of agreement (Fleiss, 1981).

Measure of Adult and Infant Soothing and Distress (MAISD).[1] The MAISD is a behavior observation scale that was developed for this study to examine the discrete behaviors exhibited by nurses, parents, and infants during children's invasive medical procedures. Rather than attempting to examine all behaviors, only those that were viewed as having potential treatment utility were selected (Hayes et al., 1987; Nelson-Gray, 2003). A systematic approach to scale development and validation was conducted, which was in line with documented suggestions (i.e., Haynes, Richard, & Kubany, 1995). Specifically, a pool of behaviors was identified via anecdotal reports from nurses and parents, observations of adult and infant behavior during infant immunizations, and behaviors identified in prior studies of infant and preschooler painful procedures (e.g., Blount et al., 1989; Dahlquist, Power, Cox, & Fernbach, 1994; Lewis &

Ramsay, 1999; Lilley, Craig, & Grunau, 1997; Manne et al., 1992; Sweet & McGrath, 1998). This process resulted in the following parent behaviors: rocking, rubbing, massaging, patting, offering pacifier, breast feeding, kissing/hugging, verbal reassuring, distracting, offering toy, and offering food. Nurse behaviors included distracting, offering toy, offering pacifier, offering food, rubbing, and verbal reassuring. Infant behaviors included engaging in distraction, playing alone with toy, sucking on pacifier, consuming food, smiling/cooing, nursing, crying, screaming, and flailing. Operational definitions were developed for each behavior consistent with prior scales (e.g., CAMPIS) and based upon agreement by the authors.

Four trained undergraduate research assistants, blind to study hypotheses, coded behaviors from the videotaped immunizations. Similar to other measures of procedural distress (e.g., CAMPIS), all behaviors were coded as present or absent during five-second intervals. Consistent with coding done with other investigations of immunization distress (e.g., Cohen, 1997, 1999, 2002), coding spanned from 3 minutes prior to when the nurse began cleaning the child's arm for the injection until 2 minutes after the needle was removed or the child left the room, whichever came first. To determine interrater agreement, Cohen's kappa statistic was evaluated for a total of 17 randomly selected participants (approximately 26% of the sample). Kappa coefficients for parent, infant, and nurse behaviors ranged from 0.66 to 1.0. These scores represent fair to excellent levels of agreement (Fleiss, 1981). Upon inspection, it was found that all of the relatively low Kappas were for behaviors with low base rates; this is a common problem with Kappa for low base rate behavior and might not reflect poor agreement (Spitznagel & Helzer, 1985; Uebersax, 1988). See Tables 1 and 2 for average occurrences of each coded behavior.

Procedure

At the first location, a health department, a research assistant approached potential participants and described the study to determine whether the parents were interested in participation. Five of the families approached declined to participate, stating that they did not have enough time. At the second location, a pediatrician's office, the pediatrician's receptionist queried eligible parents while scheduling their infant's appointment on the telephone. Interested parents were contacted by telephone by the primary investigator or a research assistant and provided with more information about the study.

On the day of the immunization, a research assistant met parents and infants at the health department or pediatrician's office. Once parental consent was obtained, families completed the History Interview. The research assistant accompanied the families into the treatment room to turn on the video camera, and then the research assistant departed. When the immunization was completed, the parents and nurse completed the VAS measures.

Results

Data Reduction

Pearson product-moment correlations were conducted to determine whether any individual MAISD infant, parent, or nurse behaviors were significantly related and could be combined for further analyses. If a significant correlation was found, the individual codes were combined and re-coded whereby the "combined" variable was counted as present if any of the individual previous coded variables were displayed during an interval. This procedure ensured that the frequency of the combined variables was not artificially inflated.

Infant cry was significantly related to infant scream, $r = .44$, $p < .001$, and infant scream

was significantly related to infant flail, $r = .49$, $p < .001$. As a result, the infant cry, scream, and flail codes were combined, and termed Infant Distress. Infant nursing and infant suck on pacifier were also significantly related, $r = .28$, $p < .03$, and combined (termed Infant Sucking) for further analyses. No other infant codes were significantly inter-related. Within parent codes, parent rub was significantly correlated with parent kiss/hug, $r = .39$, $p < .01$, and were merged (termed Parent Physical Comfort), as were parent breast feed and parent offer pacifier (termed Parent Pacify), $r = .37$, $p < .01$. None of the individual nurse codes were inter-related. Given that the current study represents a new area of inquiry and it is likely to be a first in a series of studies of behavior during infants' painful procedures, corrections for multiple correlations were not conducted.

Demographics

Pearson product moment correlational analyses were conducted to examine whether the age of the child was related to MBPS pain scores or any of the MAISD infant, parent, and nurse behaviors. The only significant relation was between child age and Parent Rocking ($r = -.34$, $p < .01$), with younger children being rocked more by their parents than older children. Parent age was not significantly related to any coded behavior. Additional Analyses of Variance (ANOVAs) revealed no infant gender, parent gender, number of injections, or site of data collection differences on infant, parent, or nurse behavior.

Validity

MAISD Infant Distress was positively associated with nurses' ratings of infant pain, $r = .27$, $p = .04$, and parents' ratings of infant pain, $r = .32$, $p < .01$. MBPS infant distress scores were positively correlated with MAISD scores of Infant Distress, $r = .44$, $p < .001$.

Infant, Parent, and Nurse Procedural Behavior

Infant behavior. Table 1 displays the descriptive statistics for infant behavior. Infants most commonly displayed behaviors were ones of Distress. These behaviors were displayed, on average, during 35 percent (*SD* = 23.04%) of 5 s intervals. Infants displayed very little Smiling/Cooing behavior (*M* = .72%, *SD* = 1.8%), and Consumed Food during a very small proportion of intervals (*M* = .64%, *SD* = 3.3%).

Parent behavior. Table 2 provides descriptive data for parent and nurse behavior. In general, parents displayed low levels of any coded behavior, with the most common behaviors, Verbal Reassurance and Physical Comfort, being exhibited, on average, in only 13.75 (*SD* = 12.4%) and 15.06 (*SD* = 15.4%) percent of the 5 s intervals, respectively. The least common behaviors exhibited by parents were Offer Toy (*M* = .83%, *SD* = 1.8%) and Offer Food (*M* = .09%, *SD* = .41%).

Nurse behavior. Nurses also displayed low frequencies of coded behaviors. The most commonly displayed behavior was Verbal Reassurance, which occurred during 9.42 percent of the 5 s intervals (*SD* = 7.73). Two of the codes specified for nurses (Offer Food and Offer Pacifier) were not displayed and were therefore removed from further analyses.

Relations among Infant, Parent, and Nurse Procedural Behavior

Infant and parent behavior. In terms of the associations among infants' and parents' behaviors, Infant Distraction was significantly related to Parent Distract, $r = .55$, $p < .001$, Parent Offer Toy, $r = .43$, $p = .001$, and Parent Physical Comfort, $r = .29$, $p = .02$. Infant Distress was significantly related only to Parent Verbal Reassurance, $r = .45$, $p < .001$. Infant Play was

significantly associated with Parent Offer Toy, $r = .36$, $p = .004$, and Infant Consume Food was significantly associated with Parent Offer Food, $r = .29$, $p = .02$.

Infant and nurse behavior. Correlations between infant and nurse behavior revealed three significant associations. Infant Distraction was positively related to Nurse Distract, $r = .48$, $p < .001$, and Nurse Offer Toy, $r = .41$, $p = .001$. Consistent with parent findings, Infant Distress was significantly positively related to Nurse Verbal Reassurance, $r = .37$, $p = .003$.

Parent and nurse behavior. Relations between nurse and parent behaviors indicate that these two parties engage in similar behaviors. Parent and Nurse Distract were significantly related, $r = .45$, $p < .001$, as were Parent and Nurse Offer Toy, $r = .40$, $p = .001$, and Parent and Nurse Verbal Reassurance, $r = .42$, $p = .001$.

Discussion

The aims of the current investigation were to develop and evaluate the psychometrics of the MAISD, and to use the scale to investigate the behavioral dynamics present during infants' immunizations. First, interrater agreement indices suggest that the MAISD behavioral codes demonstrate good reliability. As for concurrent validity, the Modified Behavior Pain Scale (MBPS; Taddio, et al.. 1995) and parent and nurse VAS ratings converged with the MAISD codes of infant distress. It should be noted that since the MAISD accurately assesses operationally-defined discrete behavior (e.g., engage in distraction) rather than constructs (e.g., distress), these analyses actually provide more support for the validity of nurse ratings and MBPS rather than the MAISD (Foster & Cone, 1995; Hayes, Barlow, & Nelson-Gray, 1999). In short, the MAISD appears to be a psychometrically sound scale for describing infant, parent, and nurse behavior during infant immunizations.

The MAISD revealed that the most common infant behaviors were ones of distress, which occurred nearly a third of the time. The least common coded infant behaviors were smiling/cooing and consuming food, which each were exhibited less than one percent of the time. Parents engaged in overall low levels of coded behavior, with anecdotal report from the coders indicating that there were long spans of time with neither of the adults speaking at all. This is consistent with findings from a study of parents of preschoolers undergoing immunizations (Cohen, Manimala, & Blount, 2000). It is possible that the reason for the restricted behavior is that parents do not know how to help their distressed infants. It could also be that the parents turn to the nurses to lead the interactions with the infants in the medical situation. If these interpretations are accurate, health care professionals should focus efforts on disseminating findings that detail helpful parenting behavior.

Nurses also displayed few behaviors, which may be because they are focused on performing the injections. However, other studies have shown that nurses can be trained to engage in high levels of helpful behavior during infants' immunizations (Cohen, 2002). It will be important to ensure that adequate dissemination of findings into health care practices is closely linked to the growing body of investigations of infant pain management.

Parents' most frequent behaviors were verbal reassurance and physical comfort, with each being displayed a little over 10 percent of the procedure, and the nurses' most frequent behavior was reassurance, which was evident in just under 10 percent of the procedure. This is consistent with prior work with preschoolers indicating that reassurance is the most common parent behavior (e.g., Blount et al., 1989), which is quite unfortunate given that research with preschoolers has suggested a causal relation between adult reassurance and child medical distress

(Manimala et al., 2000). It should be noted that in the current correlational study it is not evident whether parent reassurance is prompting infant distress, in response to infant distress, or whether a third variable is at work. Experimental work is necessary to examine any causal relations before recommendations to parents about how to respond and how to *not* respond to upset infants might be in order.

As for relations between infant and adult behavior, parents' offering of toys and distracting behavior were associated with infants' engaging in distraction, and parents' offering of toys related to infants' playing with toys. Similarly, nurses' distraction and offering of toys were related to infants' engaging in distraction. Thus, during an intense painful event, infants are responsive to the adults' efforts to engage them in distraction. These findings stand in contrast to the conclusion drawn by Lewis and Ramsey (1999), which was that parent behavior was not related to infant behavior. It should be noted that Lewis and Ramsey did not examine discrete adult or infant behavior; rather, they evaluated the overall quantity of parent behavior and infant distress reactions.

Parents' attempts to engage their infants in sucking, whether through breast feeding or use of a pacifier, appeared to be accepted by the infants. This is promising given prior work suggesting that sucking decreases infant distress (Blass & Watt, 1999; for a review, see Gibbins & Stevens, 2001).

In addition to the relations between adults and infants, parent-nurse associations can be informative. It is possible that the correlations between parent and nurse behavior might indicate a causal link. For example, one adult might be cuing the other adult in how to behave and interact with the infant. In fact, prior work has suggested that nurses might model appropriate

coaching behavior for parents during children's immunizations (Cohen et al., 1997). Given that nurse and parent distraction as well as nurse and parent reassurance were linked, it is important to appreciate that adults might model helpful or not helpful behavior.

Limitations of the study should be noted. Given the correlational nature of the work, no causal inferences can be made. Additional data are needed to clearly identify those adult behaviors that decrease infant distress as well as behaviors that might increase distress. Additionally, although internal validity is strengthened by using a restricted age range and only one medical procedure, external validity was compromised. Specifically, we do not know if these behavioral relations will be true for other children facing different medical stressors (e.g., venipuncture). Future studies could explore adult-infant interactions in other stressful situations to identify those adult behaviors that might be most helpful.

In sum, the MAISD provided several valuable findings about adult-infant behavior during infants' immunizations. Infants exhibited significant distress behavior and little "happy" behavior during their immunization procedure. Although parent and nurses exhibited few behaviors, the majority of these were ones of reassurance, which was related to infant distress. Even though no causal inference can be made, it does seem apparent that the adults are engaging in few proactive helpful behaviors, such as distraction.

Implications for Practice

Results of the current study have a number of implications for practice. The MAISD is a scale that can shed light on infant, parent, and nurse behavior during pediatric medical stressors. For instance, the current investigation demonstrates that infants are likely to exhibit high levels of distress behavior during immunizations, which provides additional evidence that pain-

management intervention is needed for this population. Unfortunately, parents and medical staff commonly engage in reassurance, a behavior that has been shown to exacerbate immunization distress with preschoolers (e.g., Manimala et al., 2000). Given that there are data suggesting that distraction might be beneficial to infants (Cohen, 2002), it is heartening that the current study established another link between adult distraction behavior and infant engaging in distraction. Clearly additional work is warranted in this area of study, and the current study suggests that there might be some fruitful avenues for intervening in adult behavior to decrease infant procedural distress. The MAISD should prove to be a valuable tool in this line of inquiry as it provides a detailed evaluation of infant, parent, and medical staff behavior during painful medical events.

References

Alexander, J., & Manno, M. (2003). Underuse of analgesia in very young pediatric patients with isolated painful injuries. *Annals of Emergency Medicine, 41,* 617-622.

Anand, K. J. S. (1998). Clinical importance of pain and stress in preterm neonates. *Biology of the Neonate, 73,* 1-9.

Anand, K. J. S., & Craig, K. D. (1996). New perspectives on the definition of pain. *Pain, 67,* 3-6.

Bakeman, R., & Gottman, J.M. (1987). *Observing interaction: An introduction to sequential analysis* (2nd ed.). New York: Cambridge.

Blount, R. L., Cohen, L. L., Frank, N. C., Bachanas, P. J., Smith, A. J., Manimala, M. R., & Pate, J. T. (1997). The Child-Adult Medical Procedure Interaction Scale-Revised: An assessment of validity. *Journal of Pediatric Psychology, 22,* 73-88.

Blount, R.L., Corbin, S.M., Sturges, J.W., Wolfe, V.V., Prater, J.M., & James, L.D. (1989). The relationship between adults' behavior and child coping and distress during BMA/LP procedures: A sequential analysis. *Behavior Therapy, 20,* 585-601.

Blount, R. L., Piira, T., & Cohen, L. L. (2003). Management of pediatric pain and distress due to medical procedures. In M. C. Roberts (Ed.). *Handbook of pediatric psychology, 3rd edition* (pp. 216-233). New York: Guilford Press.

Blass, E. M., & Watt, L. B. (1999). Suckling- and sucrose-induced analgesia in human newborns. *Pain, 83,* 611-623.

Cohen, J.A. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement, 20,* 37-46.

Cohen, L. L. (2002). Reducing infant immunization distress through distraction. *Health Psychology, 21,* 207-211.

Cohen, L. L., Blount, R. L., & Panopoulos, G. (1997). Nurse coaching and cartoon distraction: An effective and practical intervention to reduce child, parent, and nurse distress during immunizations. *Journal of Pediatric Psychology, 22,* 355-370.

Cohen, L. L., Manimala, R., Blount, R. L. (2000). Easier said than done: What parents say they do and what they do during children's immunizations. *Children's Health Care, 29,* 79-86.

Craig, K. D., McMahon, R. J., Morison, J. D., & Zaskow C. (1984). Developmental changes in the infant pain expression during immunization injections. *Social Science and Medicine, 19,* 1331-1337.

Dahlquist, L.M., Power, T.G., Cox, C.N. & Fernbach, D.J. (1994). Parenting and child distress during cancer procedures: A multidimensional assessment. *Children's Health Care, 23,* 149-166.

Derbyshire, S. W. G. (1999). Locating the beginning of pain. *Bioethics, 13,* 1-31.

Elliott, C. H., Jay, S. M., & Woody, P. (1987). An observational scale for measuring children's distress during medical procedures. *Journal of Pediatric Psychology, 12,* 543-551.

Finley, G. A., & McGrath, P. J. (Eds.). (1998). *Measurement of pain in infants and children: Vol. 10. Progress in pain research and management.* Seattle: IASP Press.

Fleiss, J. L. (1981). *Statistical methods for rates and proportions.* New York: Wiley.

Foster, S. L., & Cone, J. D. (1995). Validity issues in clinical assessment. *Psychological Assessment, 7,* 248-260.

Gibbins, S., & Stevens, B. (2001). Mechanisms of sucrose and non-nutritive sucking in procedural pain management in infants. *Pain Research and Management, 6,* 21-28.

Hayes, S. C., Barlow, D. H., & Nelson-Gray, R. O. (1999). *The scientist practitioner: Research and accountability in the age of managed care* (2nd ed.). Boston: Allyn and Bacon.

Hayes, S. C., Nelson, R. O., & Jarrett, R. B. (1987). The treatment utility of assessment: A functional approach to evaluating assessment quality. *American Psychologist, 42,* 963-974.

Haynes, S. N., Richard, D. C. S., & Kubany, E. S. (1995). Content validity in psychological assessment: A functional approach to concepts and methods. *Psychological Assessment, 7,* 238-247.

Jacobsen, P., Manne, S., Gorfinkle, K., Schorr, O., Rapkin, B. & Redd, W. (1990). Analysis of child and parent activity during painful medical procedures. *Health Psychology, 9,* 559-576.

Katz, E. R., Kellerman, J., & Siegel, S. E. (1980). Distress behavior in children with cancer undergoing medical procedures: Developmental considerations. *Journal of Consulting and Clinical Psychology, 48,* 356-365.

Lewis, M., & Ramsay, D. S. (1999). Effect of maternal soothing on infant stress response. *Child Development, 70,* 11-20.

Lilley, C.M., Craig, K.S., & Grunau, R.E. (1997). The expression of pain in infants and toddlers: developmental changes in facial action. *Pain, 72,* 161-170.

Manimala, M., Blount, R. L. & Cohen, L. L. (2000). The Influence of parental reassurance and distraction on children's reactions to an aversive medical procedure. *Children's Health Care, 29,* 161-177.

Manne, S.L., Bakeman, R., Jacobsen, P.B., Gorfinkle, K., Bernstein, D., and Redd, W.H. (1992). Adult-child interaction during invasive medical procedures. *Health Psychology, 11,* 241-249.

Manne, S. L., Redd, W. H., Jacobsen, R. B., Forfinkle, K., Schorr, O., & Rapkin, B. (1990). Behavioral intervention to reduce child and parent distress during venipuncture. *Journal of Consulting and Clinical Psychology, 58,* 565-572.

Nelson-Gray, R. O. (2003). Treatment utility of psychological assessment. *Psychological Assessment, 15,* 521-531.

Pate, J. T., Blount, R. L., Cohen, L. L., & Smith, A. J. (1996). Childhood medical experience and temperament as predictors of adult functioning in medical situations. *Children's Health Care, 25,* 281-298.

Porter, F. L., Grunau, R. E., Anand, K. J. S. (1999). Long-term effects of pain in infants. *Developmental and behavioral pediatrics, 20,* 253-261.

Porter, F. L., Wolf, C. M., Gold, J., Lotsoff, D., & Miller, J. P. (1997). Pain and pain management in newborn Infants: A survey of physicians and nurses. *Pediatrics, 100,* 626-632.

Powers, S. W., Blount, R. L., Bachanas, P. J., Cotter, M. W., & Swan, S. C. (1993). Helping preschool leukemia patients and their parents cope during injections. *Journal of Pediatric Psychology, 18,* 681-695.

Ruda, M. A. Ling, Q., Hohmann, A., Peng, Y. B., & Tachibana, T. (2000). Altered nocioceptive neuronal circuits after neonatal peripheral inflammation. *Science, 289,* 628-631.

Spitznagel, E. L., & Helzer, J. E. (1985). A proposed solution to the base rate problem in the kappa statistic. *Archives of General Psychiatry, 42,* 725-728.

Swafford, L. I., & Allan, D. (1968). Pain relief in the pediatric patient. *Medical Clinics of North America, 52,* 131-136.

Sweet, S.D., & McGrath, P.J. (1998). Relative importance of mothers' versus medical staffs' behavior in the prediction of infant immunization pain behavior. *Journal of Pediatric Psychology, 23,* 249-256.

Taddio, A., Katz, J., Ilersich, A. L., & Koren, G. (1997). Effect of neonatal circumcision on pain response during subsequent routine vaccination. *Lancet, 349,* 599-603.

Taddio, A., Nulman, I., Koren, B. S., Stevens, B., & Koren, G. (1995). A revised measure of acute pain in infants. *Journal of Pain and Symptom Management, 10,* 456-463.

Uebersax, J. S. (1988). Validity inferences from interobserver agreement. *Psychological Bulletin, 104,* 405-416.

Zimmermann, R. R., & Torrey, C. C. (1965). Ontogeny of learning. In A. M. Schrier, H. F. Harlow, & F. Stollnitz (Eds.). *Behavior of Nonhuman Primates: Modern Research Trends* (Vol. 2). New York: Academic Press.

Author Note

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Correspondence concerning this article should be addressed to Dr. Lindsey L. Cohen, Department of Psychology, Georgia State University, Atlanta, Georgia 30302-5010. Electronic mail may be sent to llcohen@gsu.edu.

Footnote

[1]The Measure of Adult-Infant Soothing and Distress (MAISD) manual and coding sheets can be obtained from the first author.

Table 1

Descriptive Statistics of Rates for Infant Behaviors

	M	*SD*
Engage in Distraction	4.92	8.31
Play Alone with Toy	8.21	13.61
Consume Food	0.64	3.30
Smiling/Cooing	0.72	1.80
Distress	34.84	23.04
Sucking	8.42	18.80

Note. Numbers indicate proportion of 5-s intervals in which the behavior occurred.

Table 2

Descriptive Statistics of Rates for Parent and Nurse Behaviors

	Parent		*Nurse*	
	M	*SD*	*M*	*SD*
Distraction	7.78	9.66	3.75	4.82
Offer Toy	0.83	1.79	0.26	1.06
Offer Food	0.09	0.41	0.00	0.00
Rocking	8.98	12.14	-	-
Verbal Reassurance	13.75	12.36	9.42	7.73
Parent Physical Comfort	15.06	15.35	-	-
Parent Pacify	1.61	6.90	-	-
Nurse Offer Pacifier	-	-	0.00	0.00
Nurse Rub	-	-	0.15	0.64

Note. Numbers indicate proportion of 5-s intervals in which the behavior occurred.