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Validation of a clinically useful measure of children's state anxiety before medical procedures

Anne L. Ersig, RN, PhD [Assistant Professor],
College of Nursing, Health Care, University of Iowa, Iowa City, Iowa, USA

Charmaine Kleiber, RN, PhD, FAAN [Associate Professor Emeritus],
College of Nursing, Health Care, University of Iowa, Iowa City, Iowa, USA

Ann Marie McCarthy, RN, PhD, FAAN [Professor], and
College of Nursing, Health Care, University of Iowa, Iowa City, Iowa, USA

Kirsten Hanrahan, ARNP, DNP [Associate Research Scientist]
Health Care, University of Iowa, Iowa City, Iowa, USA

Abstract

Purpose—Assessment of children's anxiety in busy clinic settings is an important step in developing tailored interventions. This article describes the construct validation of the Children's Anxiety Meter-State (CAM-S), a brief measure of state anxiety.

Design and Methods—Existing data were used to investigate the associations between child self-reports of anxiety, parent reports of child anxiety, and observed child distress during an intravenous procedure.

Results—Children's ($n = 421$) CAM-S scores were significantly associated with all parent measures and observed distress ratings.

Practice Implications—Findings support the use of the CAM-S for assessment of child anxiety in clinical settings.

Keywords

Anxiety; children; measurement; validation

Hospitals and other medical settings often involve situations that are distressing to children, including intrusive procedures, therapeutic interventions, limited or restricted activity, separation from the familiar, and an unfamiliar environment (Bossert, 1994). In particular, painful medical procedures, such as injections or intravenous (IV) line insertion, may lead to high levels of distress (Bossert, 1994; Claar, Walker, & Smith, 2002; Cohen et al., 2001; Smalley, 1999). Higher levels of distress have shortand long-term effects; extreme distress can jeopardize successful completion of a required procedure, and long-term effects include

difficulty with future medical procedures and avoidance of medical care (Du, Jaaniste, Champion, & Yap, 2008; Kennedy, Luhmann, & Zempsky, 2008; Matthews, 2011; Noel, McMurtry, Chambers, & McGrath, 2010).

Variability in causes of children's distress, levels of anxiety, and responses to interventions designed to lower anxiety and reduce distress highlight the need for tools facilitating rapid clinical evaluation of each child. Such tools are readily available for assessment of pain (von Baeyer, 2009), but not for anxiety. Validated measures of child anxiety are typically lengthy and designed for use in research, limiting their utility in busy clinical settings. A brief measure of child self-reported state anxiety will facilitate identification of children with high anxiety levels, as well as development of interventions to lower anxiety in clinical settings, helping clinicians provide individualized care. The purpose of this article is to describe the construct validity of the Child Anxiety Meter-State (CAM-S) as a brief measure of child state anxiety appropriate for use in a clinical setting.

BACKGROUND

Anxiety assessment typically includes both state and trait anxiety. *State* anxiety is anxiety at this moment in time; in other words, the current situation may influence the individual's level of anxiety. *Trait* anxiety, in contrast, refers to an individual's general tendency to perceive situations as anxiety-provoking; that is, the person's typical, day-to-day level of anxiety. Generally speaking, individuals with high trait anxiety are more likely to exhibit elevated state anxiety in any given situation, as they are more likely to actually interpret a particular situation as anxiety-provoking (Spielberger, 1983). Self-report measures used to assess children's state and trait anxiety include the Multidimensional Anxiety Scale for Children, the Revised Children's Manifest Anxiety Scale, and the State Trait Anxiety Inventory for Children (STAI-C) (March, Parker, Sullivan, Stallings, & Conners, 1997; March, Sullivan, & Parker, 1999; Reynolds, 1980; Spielberger, 1973). Developed for use in research, these measures have well established reliability and validity; however, their structure and length limits their clinical utility in busy settings. (Acronyms used in this article are found in Table 1).

Parent and observational proxy measures

In lieu of child report, parent proxy reports are sometimes used to gather data on children's experiences. Parent proxy measures of child anxiety include the anxiety subscale of the Pediatric Behavior Scale-30 (PBS-30; Conrad, Richman, Lindgren, & Nopoulos, 2010), the parent proxy version of the PedsQL, which includes an emotional functioning scale (Varni, Burwinkle, & Katz, 2004), and the Perception of Procedures Questionnaire (PPQ; Kazak, Penati, Waibel, & Blackall, 1996), which assesses child and parent procedural distress. Despite their frequent use, parent proxy measures may not provide sufficient information on the child's experiences. Although some studies have reported significant correlations between mother and child ratings of child anxiety (March et al., 1997; Wachtel, Rodrigue, Geffken, Graham-Pole, & Turner, 1994), correlations between mothers' and children's reports of child anxiety tend to be low, both for children with anxiety disorders (Niditch & Varela, 2011) and for children having invasive medical procedures (Wachtel et al., 1994).

Observational measures are also used to evaluate children's pain, anxiety, and distress, with the intent of gathering additional information to provide insight into children's responses to medical procedures (Pretzlik & Sylva, 1999). Few observational measures are specific to child anxiety. The Yale Preoperative Anxiety Scale (Kain et al., 1995) was developed to assess anxiety in children in the preoperative setting but has not been expanded beyond that setting. The Observational Scale of Child Distress-Revised (OSBD-R; Elliott, Jay, & Woody, 1987) and the Child–Adult Medical Procedure Interaction Scale-Revised (CAMPIS-R; Blount et al., 1997) are broader measures of distress. The OSBD-R measures behavioral distress, and may be more specific to anxiety than to pain (Elliott et al., 1987). The CAMPIS-R evaluates children's procedural distress and coping as well as coping and distress-promoting behaviors exhibited by parents and medical personnel (Blount, Bunke, Cohen, & Forbes, 2001). However, both the OSBD-R and the CAMPIS-R require training in their use and time to administer; these characteristics make them appropriate for use in research but unrealistic for routine clinical use.

Self-report measures

While parent proxy and observational measures may give an indication of child anxiety, only child self-report provides insight into the *child's* internal feelings and experiences. However, development of brief, sensitive, age-appropriate child self-report measures appropriate for use in busy clinical settings remains a challenge (Worrall-Davies & Marino-Francis, 2008). Prior work adapted visual analog scales (VASs) for assessment of child anxiety in clinical settings. Cohen, Blount, Cohen, and Johnson (2004) used a horizontal 100-mm VAS to assess children's anxiety following immunization. Immediately after the injection, children ages 9–11 years ($n = 39$) were asked, "How upset were you during the shot?" "Upset" was used instead of anxious because of concerns about children understanding the meaning of the term anxious. Self-reported anxiety was significantly associated with self-reported pain ($r = .72$), but did not correlate with nurse ratings of child anxiety or the CAMPIS-R, which was completed by trained observers (Cohen et al., 2004). Crandall, Lammers, Senders, Savedra, and Braun (2007) designed a horizontal 10-point VAS to assess children's state anxiety and performed initial validation with 60 children, 7–13 years old, having tonsillectomies. Scores on the scale were significantly associated ($p < .001$) with the state scale of the STAI-C (Crandall et al., 2007).

Tiedeman and Clatworthy (1990) developed a vertically oriented scale, which uses an animal analogy, to assess child self-reported anxiety in children as young as 5 years old. With the Child Rating of Anxiety (CRA) scale, children are told, "Rabbits who are worried or frightened go into their holes. The more worried or frightened they are the deeper they go. If you were a rabbit how deep would you go because of your worry and fear about yourself? Color the space where you would be" (Clatworthy, 1979). In their study of children 5–11 years old ($N = 139$) assessed during and after hospitalization, the CRA was not correlated with an art-based measure of child anxiety but was significantly correlated with the state anxiety scale of the STAI-C posthospitalization. A limitation of the CRA is that the instructions ask children to rate worry or fear, two concepts that may or may not mean the same thing to young children. Kleiber, Sorenson, Whiteside, Gronstal, and Tannous (2002) modified the CRA into the Child Anxiety Meter (CAM), an instrument resembling a vertical

mercury thermometer. Instead of using the "rabbit in a hole" analogy, children were asked to show how much worry or anxious feelings they had by showing how far up the thermometer their feelings were. In their study of children ages 7–13, they found a positive correlation (r = .39) between anxiety ratings on the CAM and children's self-reported pain with IV insertions.

These studies provide initial data on the use of brief self-report ratings of school-aged children's state anxiety in clinical settings. However, brief instruments for younger children that measure child state anxiety efficiently at the point of care need further testing and validation before routine implementation in practice. This study investigated the construct validity of the CAM-S for use with children from the ages of 4 to 10.

METHODS

This is a secondary analysis of data collected during a multisite randomized controlled trial. The trial trained parents to use distraction coaching with children having IVs placed for scheduled medical procedures. Parents in the intervention group were trained to use distraction coaching during the procedure, while the control group received routine care without parental training. The major outcome variable of interest for the primary study was child distress during the IV insertion (McCarthy et al., 2010a, 2010b). The institutional review board at each of the three participating sites approved the primary study and all secondary analyses that are consistent with the overall intent of the original study. Consent was obtained from the parent or guardian accompanying the child to the clinic visit, and assent was obtained from children 7 years of age or older.

Sample and setting

Children were 4–10 years old and scheduled for a medical procedure requiring peripheral IV placement. Eligible families spoke and read English, and eligible children were at a grade level appropriate for age. Data were gathered from the child and one accompanying adult during the 30 min prior to IV insertion. IV insertion procedures for the primary study were videotaped, with the camera focused on the child and his or her reactions; these videotapes were used to code the observational measure of child distress.

Measures

Measures used in this secondary analysis included child self-report of both state and trait anxiety, an observational measure of child distress, and multiple parent proxy measures of child anxiety. The child self-report measure of state anxiety was expected to be positively correlated with the other measures.

CAM—The CAM scale is drawn to resemble a thermometer with a bulb at the bottom and horizontal lines at intervals going up to the top (see Figure 1). Children are instructed to "Pretend that all of your worried or nervous feelings are in the bulb or bottom part of the thermometer. If you are a little bit worried or nervous, the feelings might come up in the thermometer just a little bit. If you are very, very worried or nervous, the feelings might go all the way to the top. Put a line on the thermometer showing how much worry or

nervousness you feel." We discovered quite early in our data collection process that some children were unfamiliar with the typical mercury thermometer represented in the scale. When children did not understand this analogy, we used an alternate script that did not explicitly describe a thermometer. Children were asked to "Pretend that all of your worried or nervous feelings are in the very bottom down here (point to scale). If you are a little bit worried or nervous, the feelings might come up just a little bit (move finger up). If you are very, very worried or nervous, the feelings might go all the way to the top (move finger up to top). Put a line showing how much worry or nervousness you feel."

To measure state anxiety (CAM-S), children are asked to mark how they feel "right now." To measure trait anxiety (CAM-T), another copy of the scale is presented, and they are asked to mark how they "usually feel at home." Examples of being at home are provided to the children, like "think about when you were playing outside with a friend" and "think about sitting quietly watching TV." The preliminary validation analysis found that most children (88%) were more worried in the clinic than at home on a normal day, and those who were more worried at home provided appropriate explanations (Kleiber & McCarthy, 2006).

Before completing the CAM-S and CAM-T, children were screened for their ability to rank order by size. They were asked to count to 10, and then answer, "Which is bigger, 7 or 4?" Children were also asked to identify the smallest of a series of four stacking cups. Children unable to complete these tasks successfully or who did not understand the instructions did not complete the CAM-S or CAM-T.

Following data collection, two members of the research team reviewed and scored children's CAM ratings. A transparent overlay with marked ½ point increments was placed on top of the child's ratings, which were then rounded up to the closest ½ point increment. Scores can range from 0 to 10.

Observed child distress

As a behavioral measure of child distress during painful medical procedures, the OSBD-R (Elliott et al., 1987) includes eight behavioral categories that demonstrate children's anxiety and/or pain. The child's behavior is recorded at defined time intervals, with weightings to indicate distress intensity. Total distress scores are calculated by adding weighted values of each behavior at each interval, with higher scores indicating more distress. Scores range from 0 to 22. The developers reported internal consistency of .72; Cronbach's alpha for this study was .76. In this study, the OSBD-R provided a measure of observed child distress during IV insertion. A trained observer scored the OSBD-R for each participant, while a second trained coder scored every fifth videotape. Interrater agreement for double-coded tapes was 99.3%.

Parent ratings—Parents completed the PBS-30, adapted from the full-length, 165-item Pediatric Behavior Scale (Conrad et al., 2010). One of the four subscales of the PBS-30 assesses depression and anxiety, with an internal reliability coefficient of .80 (McCarthy, Lindgren, Mengeling, Tsalikian, & Engvall, 2002); Cronbach's alpha for this study was .74. The depression/anxiety subscale is comprised of three questions: Is your child generally: (a)

fearful, anxious, or worried, (b) self-conscious or easily embarrassed, and (c) afraid to try new things for fear of making mistakes? Responses use a 4-point Likert scale (0 = *almost never or not at all*; 1 = *sometimes or just a little*; 2 = *often or pretty much*; 3 = *very often or very much*). The score for this subscale ranges from 0 to 9, with 0 indicating the least anxiety and 9 indicating the most anxiety.

Additionally, parents answered Likert-type questions about their children's distress with procedures. Three questions, "How distressed does your child become during painful medical procedures"; "How distressed does your child become during routine clinic visits on days at the clinic or hospital when no medical procedures are scheduled to be done"; and "On a day of IV insertion, how distressed does your child become in the morning" are derived from the PPQ (Kazak et al., 1996) and were modified, with permission, by Kleiber, Craft-Rosenberg, and Harper (2001). Because Kleiber and colleagues reported that the three questions combined as a scale had a fairly low alpha coefficient (.57), we considered them as separate items for this study. Finally, parents were asked, "How do you expect your child to behave during today's IV insertion?" All of these questions were on a 7-point horizontal scale anchored from 1 *(not at all distressed)* to 7 *(extremely distressed).*

Covariates—Parents provided the child's gender, date of birth, and racial/ethnic background. Parents were also asked "Does your child have a current diagnosis of anxiety disorder?" Children with anxiety disorders may have higher state and trait anxiety, potentially increasing variability in the data. Because of the statistical incentive for increased variability, data from children with and without a diagnosed anxiety disorder were analyzed together first, and then data just from children with anxiety disorders were examined separately.

Data analysis—Data were double entered into a Microsoft Access database (Microsoft, Redmond, WA, USA) and stored on a secure server. All analyses were conducted using SAS 9.3 (SAS Institute Inc., Cary, NC, USA). A Spearman correlation was conducted to test the association between child self-reported state anxiety and the other variables of interest (self-reported trait anxiety, the behavioral measure of child distress during IV placement, and parent report of child anxiety). A *p*-value of .05 was used to determine significance.

RESULTS

Participants

In the primary study, 542 families participated. This analysis is restricted to the 421 (*N*) children who completed both the CAM-S and CAM-T. Of the 121 children who did not complete both CAMs, 15 children (mean age 5.13, range 4–6 years) were unable to complete the seriation screen. For 13 children (mean age 4.38, range 4–5 years), we were unable to determine their understanding (e.g., child too shy to participate or refused to participate in the seriation screen).The92 children who passed the seriation screen but did not complete both CAMs were an average of 5.18 years old with a range of 4–10.It is unknown why these children did not complete the CAM-S and CAM-T.

Children who completed both CAMs were, on average, 7.5 years old (standard deviation [*SD*] = 1.7 years). Gender was nearly evenly split: 210 females (49.88%) and 211 males (50.12%) participated. Participants were primarily Caucasian (82.4% children; 88.8% mothers; 84.3% fathers), and accompanying adults were most often mothers (*n* = 374, 88.8%), although fathers (*n* = 45, 10.7%) and guardians (*n* = 2, < 1%) also participated. These proportions are not significantly different from the demographics for the entire sample of 542 families in the primary study.

Child self-report of anxiety

The mean score for child state anxiety was 3.6 ± 3.2 on the 0–10 CAM-S. In comparison, the mean score for children's levels of trait anxiety (CAM-T) was 1.6 ± 2.6. The correlation between CAM-S and CAM-T was $r = .37$ ($p < .0001$). Three hundred sixty-two children reported higher state versus trait anxiety (mean difference +2.1 ± 3.5); however, 59 children (14%) reported lower state versus trait anxiety (mean difference −2.06 ± 3.5). This percentage is similar to that reported in the pilot study (Kleiber & McCarthy, 2006). Children reporting higher anxiety at home were younger ($p = .002$) and more likely to have been diagnosed with an anxiety disorder ($p = .01$), but did not differ on parent or observed ratings of trait anxiety, gender, or race. Most of these children were able to tell the research assistant why they were more anxious at home, giving reasons such as fighting with a sibling.

Association with other measures

Means, correlations, and confidence intervals for associations between the CAM-S and the other variables are provided in Table 2. The CAM-S was significantly associated ($r = .19$) with the behavioral distress children displayed during the IV procedure, as measured with the OBSD-R. Parent ratings of child anxiety, measured with the PBS-Anxiety subscale and expected distress of their children during the upcoming IV procedures, were significantly correlated with children's self-report of state anxiety on the CAM-S ($r = .18$ and .25, respectively). CAM-S scores were also positively correlated with the child's typical distress with medical procedures ($r = .26$), distress during a routine clinic visit ($r = .15$), typical distress the morning of an IV insertion ($r = .24$), and the child's expected distress during the IV procedure ($r = .25$).

By parent report, 15 children (3.5%) were diagnosed with an anxiety disorder, and 5 of those were on at least one medication for the condition. Compared with children without a diagnosed anxiety disorder, these children had higher CAM-T anxiety ($p = .027$) and higher parent ratings of child trait anxiety (PBS-Anxiety; 5.9 ± 1.2 versus 2.8 ± 2; $p < .0001$), typical distress levels on routine clinic days (3.9 ± 2.1 versus 2.1 ± 1.4; $p = .0007$), and typical distress levels on the morning of an IV insertion (5.4 ± 1.4 versus 3.5 ± 1.8; $p = .0004$). Although parent ratings of child anxiety on the PBS-Anxiety subscale were slightly higher in children diagnosed with an anxiety disorder, this difference was not statistically significant (4.9 ± 1.8 versus 4.1 ± 1.6; $p=.08$). Children with and without an anxiety disorder did not differ significantly on self-reported state anxiety, age, gender, OSBD-R score, or parent rating of typical level of distress during painful medical procedures.

DISCUSSION

This analysis provides evidence of the construct validity of a brief vertical analog scale, the CAM-S, to assess self-reported state anxiety in young children. CAM-S scores were associated with child self-reported trait anxiety (CAM-T), observed child distress, parent reports of child anxiety and distress, and typical levels of distress related to medical procedures, clinic appointments, and IV insertion. The CAM scales were successfully completed by nearly 80% of 4-to 10-year-old study participants 30 min before a scheduled IV insertion in a busy pediatric specialty clinic. It took less than a minute to screen children for understanding of order, using a seriation task, and to complete the CAM-S and CAM-T. This supports use of the CAM in similar clinical settings, providing a measure to rapidly assess child anxiety and identify those who may benefit from interventions to alleviate anxiety.

Children's self-reports of their emotional states are essential to understanding their internal feelings and experiences; however, it is difficult to know whether their responses are influenced by the structure of the assessment tool (Chambers & Johnston, 2002). Previous work resulted in vertical (Clatworthy, 1979) and horizontal (Cohen et al., 2004; Crandall et al., 2007) measures of anxiety. Limitations of these previously developed measures led to the creation of the CAM. The horizontal scale used by Cohen and colleagues (2004) was associated with self-reported pain but not nurse proxy or observational measures of anxiety; it was not compared with other measures of child self-reported anxiety (Cohen et al., 2004). Use of VAS with children can lead to skewed responses. For example, some children prefer to select the endpoints of a VAS, as opposed to points in the middle (Cohen, 2008; van Laerhoven, van der Zaag-Loonen, & Derkx, 2004). Results from this study did not show evidence of this preference.

Initially, we explained the CAM as a drawing of a thermometer, but some children had no experience with mercury thermometers. Most children who were able to complete the seriation screen were also able to understand that marking at the bottom of the scale meant having few worries or anxious feelings and marking higher on the scale meant having more worries or anxious feelings. This is consistent with the development of abstract thought. Young children need a straightforward explanation. We recommend that clinicians not use the thermometer analogy when explaining the CAM scale to children in practice.

In this study, state anxiety scores were associated with trait anxiety scores. This finding mirrors associations found using measures of child anxiety intended for research (Montgomery & Finch, 1974; Reynolds, 1980), suggesting that children who are generally more anxious in day-to-day life may be more anxious in response to clinical settings (Spielberger, 1973, 1983). Also, CAM-S scores were associated with parent reports of child distress and observed distress, implying connections between internalizing and externalizing behaviors among these children.

Parent and child ratings of anxiety are not always the same. De Los Reyes and Kazdin (2005) suggested the value of collecting information from both because there is no "gold standard" for comparison. Children most likely know their own feelings best, but until they

reach a developmental level that allows them to comprehend the meaning of terms such as worry, parent opinions can be very useful. We believe that children should be active participants in their health care as soon as they are able to do so. Using instruments such as the CAM for assessing children's anxiety is one tool for planning individualized care.

Limitations

Although this analysis provides evidence of construct validity of the CAM-S for assessing child self-reported state anxiety, potential drawbacks are noted. First, words and phrases are used as substitutes for the word anxiety. In this study, the introduction to the CAM used the words *worry* and *nervous*. Worry has been used as a term for anxiety in previous studies (Dahlquist et al., 1986; Muris, Meesters, Merckelbach, Sermon, & Zwakhalen, 1998; Rennick et al., 2011), as has upset (Cohen et al., 2004). However, children's understanding of these terms is an understudied area. Additional work exploring the words that children use to describe anxiety and related concepts is needed.

Concerns have been raised about using a VAS with children less than 7 years of age (Cohen, 2008; Kleiber & McCarthy, 2006; Shields, Palermo, Powers, Grewe, & Smith, 2003). Ability to order different shapes by relative size, age (> 5.6 years), and IQ (> 100) predict successful visual analog use (Shields et al., 2003). A combination of age-appropriate academic achievement and successful completion of a seriation task best predicted visual analog use for 5- and 6-year-old children, while successful completion of the seriation task alone predicted VAS use in children 7 and older (Shields, Palermo, Powers, Fernandez, & Smith, 2005). In our study, children who were unable to successfully complete a seriation task were not asked to complete the CAM. We did find statistically significant age differences in the group of children unable to complete the seriation task (mean age 5.13 years) and those who were able to complete it (mean age 7.5 years). Although children under the age of 5 may have more difficulty grasping the concept of seriation, we think that it is worth at least screening children for their understanding. Because younger children are at risk for being more distressed with medical procedures, it is important to identify those who are also more anxious before the procedure so that resources can be directed toward their procedural experience.

Additional limitations of the current study include the relatively small sample size and restricted geographic location of the study sites. Studies with larger, more diverse populations will help determine if the CAM is a valid measure of child self-reported anxiety in other clinical contexts. Because this secondary analysis used existing data, the analysis is limited by the measures chosen for the original study.

Acknowledgment

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How might this information affect nursing practice?

Results from this analysis demonstrate that the CAM-S, a brief vertical scale for child self-report of state of anxiety, has construct validity because it is significantly correlated with parent proxy and observational measures of child anxiety and distress. Adoption of brief measures such as this in clinical settings where pediatric patients are likely to experience anxiety and distress may assist in tailoring anxiety-reducing interventions to children's individual needs. This has implications for modifying the environment to be especially relaxing and quiet, providing distraction materials for the child during the visit, and engaging the help of a health professional such as a Child Life Specialist.

Although this study did not identify specific CAM-S scores to trigger professional intervention, nurses have an ethical responsibility to act on any concerns presented by the child. Anxious children are more likely to have poor emotional responses to stressful situations including healthcare visits, being separated from parents, and having medical procedures. If anxious children can be identified prior to clinic visits or procedures, nurses can take the appropriate action to help children manage their anxiety. For example, if nurses in clinics routinely ask children about their anxiety on the CAM-S upon arrival, they can screen for children who may need professional assistance during the visit. The scale can also identify children who report low anxiety and may not need additional professional help during the visit.

Color the thermometer up to where you **FEEL RIGHT NOW.**

VERY VERY NERVOUS OR WORRIED

CALM: NOT NERVOUS OR WORRIED
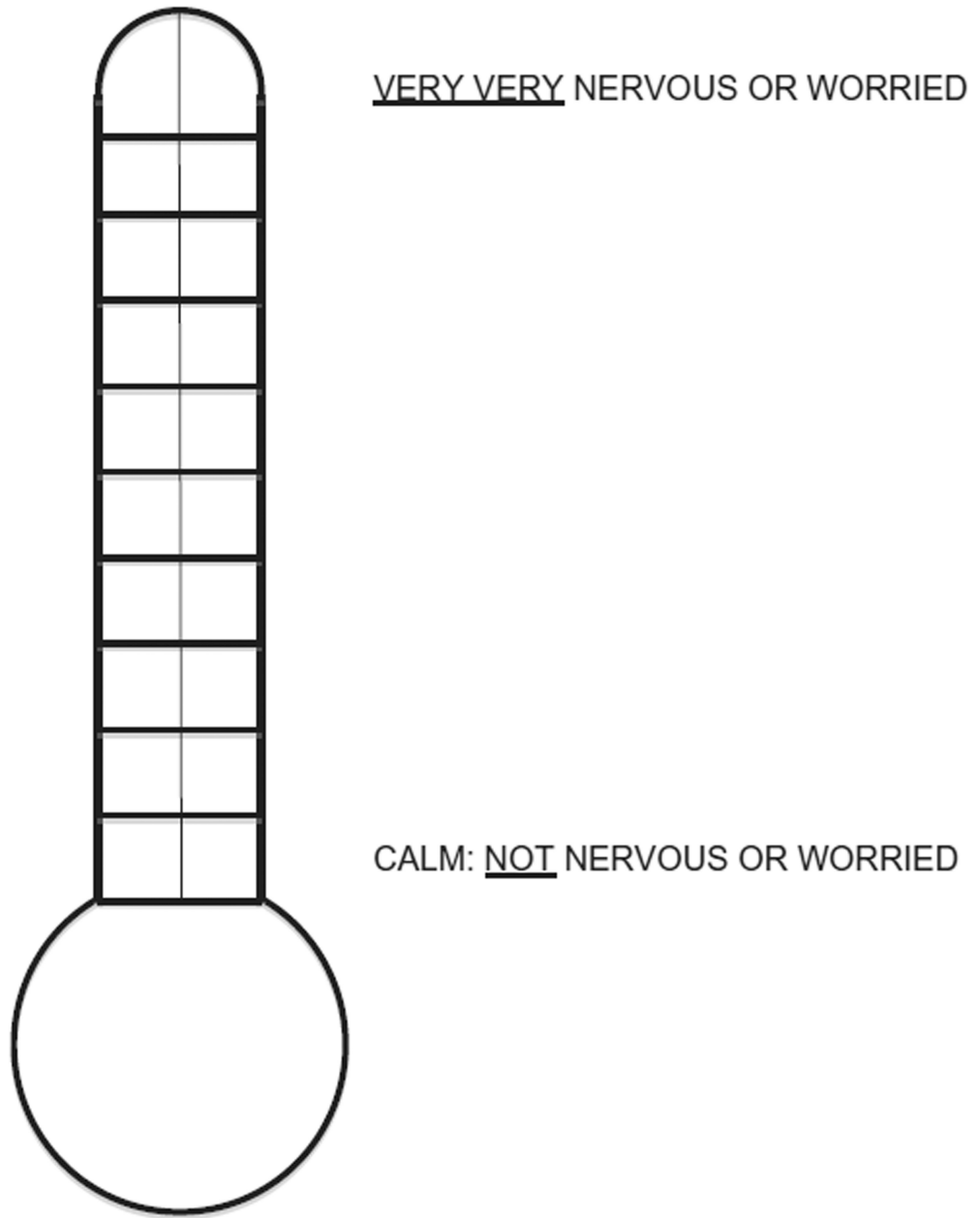
Figure 1.
Children's Anxiety Meter-State (CAM-S).

Table 1

Glossary of Acronyms

Acronym	Title of Instrument	Description and Items
CAM, CAM-S, CAM-T	Child Anxiety Meter can be used for state and trait anxiety	Vertical analog for child self-report of state (1 item) and trait (1 item) anxiety
CRA	Child Rating of Anxiety	Vertical analog for child self-report of state anxiety (1 item)
STAI-C	State Trait Anxiety Inventory for Children	Child self-report of state anxiety (20 items) and trait anxiety (20 items)
RCMAS	Revised Children's Manifest Anxiety Scale	Child self-report of oversensitivity and worry (37 items)
MASC	Multidimensional Anxiety Scale for Children	Child self-report of social anxiety, separation anxiety, and harm avoidance (39 items)
PBS-30	Pediatric Behavior Scale-30	Parent report of child anxiety (3 items)
PedsQL	Pediatric Quality of Life	Parent or child report of health-related quality of life (23 items)
PPQ	Perception of Procedures Questionnaire	Parent report of child distress before (4 items) and during (5 items) a procedure
CAMPIS-R	Child–Adult Medical Procedure Interaction Scale-Revised	Observed child distress behaviors scored over time (35 behavior categories)
OSBD-R	Observational Scale of Child Distress-Revised	Observed child distress behaviors scored over time (8 behavior categories)

Table 2

Associations Between Child Self-Report of State Anxiety (CAM-S) and Other Measures

	Mean (*SD*)	Correlation	95% CI	*p*-value
Child self-report of trait anxiety (CAM-T)	1.6 (2.6)	.37	.28–.45	< .0001
Observed child distress (OSBD-R)	2.9 (3.7)	.19	.09–.28	.0001
Parent ratings				
Child trait anxiety (PBS-Anxiety Subscale)	2.9 (2.0)	.18	.08–.27	.0002
Typical distress with medical procedures	4.6 (1.5)	.26	.17–.35	< .0001
Typical distress during routine clinic visits without medical procedures	2.2 (1.5)	.15	.06–.24	.002
Typical distress in the morning before an IV insertion	3.6 (1.8)	.24	.14–.33	< .0001
Expected distress of child during the IV procedure	4.1 (1.6)	.25	.16–.34	< .0001

Note: *SD* = standard deviation; CI = confidence interval.