Pain in Children: Comparison of Assessment Scales

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The validity, reliability, and preference of 6 pain assessment scales were investigated on a sample of 150 hospitalized children ages 3 to 18 years. Children's perception and pain ratings of procedures/bodily symptoms were also analyzed. This study attempts to provide the basis for selecting suitable research scales for pain assessment.

A study was conducted to compare validity, reliability, and preference of scales purported to assess pain intensity in different-aged children.

The following questions were investigated:

1. What is the test-retest reliability and concurrent validity of the 6 assessment scales?
2. Which scale is most preferred by different-aged children?
3. Is there a relationship among the colors children choose to rate pain and their favorite color?
4. What events (procedures/bodily pain or symptoms) do hospitalized children identify as painful?

In analyzing the data of painful events, the following additional questions were explored: Do children consider the same procedures as painful?; Does the average pain rating of painful events differ?; Does sex or age influence children's rating of pain intensity?; Do some conditions involve significantly more bodily pain than other diagnoses?; Do children's previous experiences with pain affect their ratings of painful events?

Significance of Research

A cardinal nursing responsibility is providing comfort. Therefore, optimal management of pain is critical to achieving this goal. However, without methods to quantitatively assess pain, it is impossible to plan appropriate interventions and evaluate their effectiveness.

A principal method of assessing pain in children is behavioral observation, such as body language and oral expression (Bradshaw & Zeanah, 1986). However, behavioral reactions and the degree of physical pain are not always correlated. Hester (1979) found that children who responded to painful stimuli with facial or motor behavior rated their pain less than those who exhibited fewer behavioral reactions. In addition, behaviors such as irritability, restlessness, depression, and aggression are frequently attributed to causes other than pain because of the lack of tools to assess pain as a contributing or causative factor (Beyer & Byers, 1985).

Studies have also pointed out the discrepancies between adult patients' and the nursing staff's assessment of pain (Heidrich, Perry, & Amand, 1981; Perry, Heidrich, & Ramos, 1981; Perry & Heidrich, 1982; Varchol, 1983; Walkenstein, 1982). Typically, nurses rate pain as less severe than patients rate their pain. Most of the assessment is made from the nurses' perceptions of what the pain must be like. However, only the person experiencing pain can tell another what it is like. Young children are at a distinct disadvantage because their vocabulary does not permit them a detailed description of pain. A most unfortunate consequence of this misconception is that children are undermedicated for pain. A dramatic demonstration of this is Eland's (1974) study, which compared the administration of analgesics to 25 hospitalized children and a matched-pair

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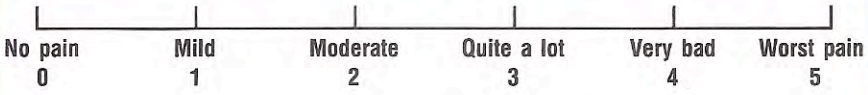
NOTE: For a copy of the faces scale, send a stamped self-addressed business envelope to Ms. C. Baker; 4412 St. Thomas Dr.; Oklahoma City, OK 73120.

of 18 hospitalized adults. Twelve of the children received a total of 24 doses of analgesics; 13 children received no pain medication. In contrast, the adults received a total of 671 doses of analgesics. Unfortunately, more recent studies on the use of analgesics to treat pain in children confirm Eland's original findings (Beyer, DeGood, Ashley, & Russell, 1983; Mather & Mackie, 1983; Schechter, Allen, & Hanson, 1986). With reliable and valid pain assessment scales that do not necessarily rely on verbal descriptions of pain, health professionals may more readily assess the intensity of a child's pain and manage it effectively.

Reliable and valid pain assessment scales are critical for conducting research on pain perception and management. Presently, one of the principal criticisms of existing research on pain assessment in children is that there is little documentation of reliability and validity of the scales, particularly in relation to the child's age (Beyer & Knapp, 1986). This study is an attempt to provide the basis for selecting suitable research scales for pain assessment.

A second objective is the identification of painful events as perceived by hospitalized children. Such knowledge could assist health professionals in recognizing and lessening the discomfort. It may also provide evidence for some authorities' contention that always telling children a procedure "may hurt" is actually *not* supportive because each child perceives sensations differently (Olness, 1981).

Figure 1. Simple Descriptive Scale



Explain to child that at one end of the line is NO PAIN because the person feels no hurt. At the other end is WORST PAIN because the person feels the worst pain imaginable. The words in between are MILD for just a little pain, MODERATE for a little more, QUITE A LOT for even more, and VERY BAD for a whole lot of pain. Ask child to choose the word that best describes how he/she is feeling.

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Review of Literature

While limited research has been conducted on developing assessment scales for children, there is little published data on comparing existing scales with different-aged children and very limited support of the existing scales' reliability and validity. Data on pain assessment scales such as the simple descriptive scale, numeric rating scale, and visual analogue scale, indicate that these scales are easily administered, well-accepted by patients, and satisfactorily correlate with clinical pain in adults (Huskisson, 1974; Ohnhaus & Adler, 1975; Reading, 1980; Revill, Robinson, Rosen, & Hogg, 1976; Woodforde & Merskey, 1972). However, almost no research has been conducted on the reliability and validity of using these scales with children. Of the existing research, Abu-Saad and Holzemer (1981) found a modified version of the visual analogue scale (end points marked "I have no pain" and "I have very severe pain" with 10 slash marks at regular intervals) to be reliable and valid with subjects ages 9 to 15 years.

Among the scales developed for assessment of intensity of pain in children, Alyea (1978), Eland (1974), and Ward (1975) used picture projection techniques in the form of cartoon animals or faces for children to rate pain. Hester (1979) used poker chips to help children quantify pain. Hester's study also compared the Poker Chip Tool with the Eland Projective Tool and found the Poker Chip Tool to be more valid. Eland (1981a) adapted the Stewart Pain Color Scale (Stewart, 1977) for use with children. Further refinements and adaptations were made by Hester, Davis, Hanson, and Hassanein (1978), Loebach (1979) and Schroeder (1983). Studies using the Eland Color Scale or other projective techniques that incorporate colors found red to be the most pain color and yellow, blue, or green to be the least pain colors (Hammond, 1982; Scott, 1978).

Molsberry (1979) developed the Hurt Thermometer as an alternative form of the Hester Poker Chip Tool. A comparison of a modified Hester Poker Chip Tool and the Hurt Thermometer found a positive correlation between the two tools. Beyer (1984) developed the Oucher, which consists of a numerical scale (0-100) for older children and a photographic scale of 6 faces (from a no pain face to a most pain face using a 3-year old male) for younger children. Preliminary research with 11 children ages 4.8 to 15.9 years demonstrated construct validity for the instrument. Moderately high evidence for content validity for the photographic scale of the Oucher was demonstrated for children 4 to 7 years, with variable evidence with 3 year-old children (Beyer & Aradine, 1986).

In the majority of the cited studies, the children ranged in age from 4 to 8 years. Although no study considered individual or group age as a factor in the reliability or validity of the scales, Molsberry (1979) questioned the validity of the Poker Chip Tool and Hurt Thermometer in children younger than 6 years. Hester and others (1978) suggested that the Poker Chip Tool may be too simple for older children.

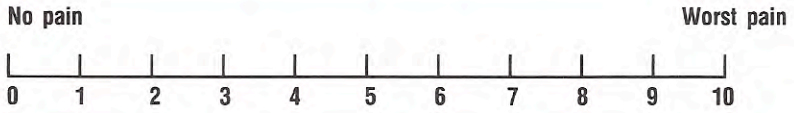
Although the literature is replete with articles attesting to the multiple stresses imposed upon children during hospitalization, few studies have investigated those events that children list as painful. Eland and Anderson (1977) reported that almost half the children interviewed stated that a "needle" or "shot" hurt the worst. Hester and others (1978) found that invasive procedures, such as "shots," "needles," "drawing blood," "spinal tap," and "bone marrow," were the most frequently reported items. However, neither study looked at age or sex as variables.

Methods

Sample. A convenience sample consisted of 150 hospitalized children in three age groups: 3 to 7 ($n = 52$), 8 to 12 ($n = 52$), and 13 to 18 years ($n = 46$). These age groups represent Piaget's three major cognitive periods of childhood: preoperational stage, concrete operations, and formal operations, respectively. There were 87 males and 63 females; the majority of the subjects were white. Of the 150 children tested, up to 13 sets of data were incomplete on one or more measures. For example, some children only listed one painful event, which did not allow for validity testing. Therefore, data analysis was not performed on the total number of subjects for all measures. Seventy-nine children were retested.

Criteria for eligibility included that the children were alert and not in pain during testing, had no developmental delays, spoke English, and gave assent to participate in the project. Parental permission was also a prerequisite. The sample was drawn from the pedi-

Figure 2. Numeric Scale



Explain to child that at one end of the line is a 0, which means that a person feels no pain (hurt). At the other end is a 10, which means the person feels the worst pain imaginable. The numbers 1 to 9 are for a very little pain to a whole lot of pain. Ask child to choose the number that best describes how he/she is feeling. On this scale, a 10 is equivalent to a 5 on the other scales.

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Figure 3. Faces Rating Scale

Explain to the child that each face is for a person who feels happy because he has no pain (hurt) or sad because he has some or a lot of pain. Face 0 is very happy because he doesn't hurt at all. Face 1 hurts just a little bit. Face 2 hurts a little more. Face 3 hurts even more. Face 4 hurts a whole lot, but Face 5 hurts as much as you can imagine, although you don't have to be crying to feel this bad. Ask child to choose the face that best describes how he/she is feeling.

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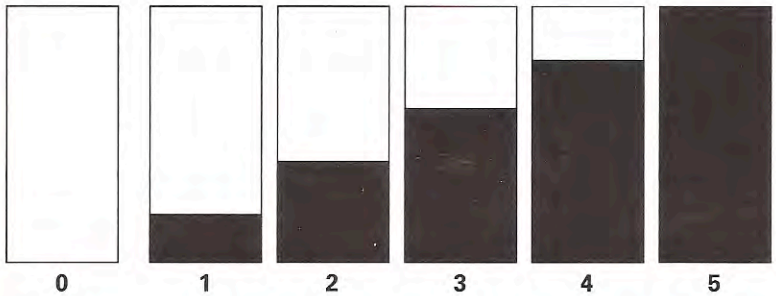
Figure 4. Glasses Rating Scale



Explain to child that there are 6 glasses with different amounts of pain (hurt) in 5 of them. The empty glass is for no pain. Glass 5 is completely filled with the worst pain imaginable. The glasses in between have from very little to a whole lot of pain. Ask child to choose the glass that best describes how he/she is feeling.

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atric units of two general hospitals in the South-Central United States. The study was approved by the Institutional Review Boards of both hospitals.

Procedure. During a time when no painful or upsetting procedures were being performed, the subjects were asked to list those events (defined as procedures or bodily symptoms or pain) they had experienced since being hospitalized that were painful and to rank them from most to least painful. They were also asked to identify their favorite color. After the children identified the painful events, each scale was explained and the subjects rated the event using that scale. This was repeated for each scale, except for children under age 5 who did not use the simple descriptive or numeric scales unless they demonstrated an understanding of them. The painful events were assessed randomly and the scales were presented randomly to prevent bias in the sequence of testing. After using all the scales, the subjects were asked to rank the scales from those they liked best to least. In addition, all procedures the subjects had experienced since admission were recorded.

Testing was done in the child's room unless a roommate was also tested. In this instance, an empty room was used. Retesting occurred the day after the initial test except in a few instances when it was done 2 to 4 days later. Parents were invited to stay with the child during testing and most elected to do so. No parent interfered with testing.

Data-collection instruments. The following is a description of the six scales that were administered to the subjects:

The *simple descriptive scale* (see Figure 1) uses descriptive words to denote varying intensities of pain. The child chooses the one word that most nearly describes the pain. Numeric values from 0 to 5 are assigned to the words for statistical analysis.

The *numeric scale* (see Figure 2) utilizes a straight line with the end points identified as "no pain" and "worst pain" and divisions along the line marked in units from 0 to 10. The child chooses the number that he/she thinks describes the intensity of pain.

The *faces scale* (see Figure 3) is an adaptation of the picture projection technique in which six faces are shown to a child. The first picture is a very happy smiling face and the last is a sad, tearful face. The pictures in between show varying degrees of sadness. The child chooses which face is most like his or her's during the painful event. For statistical purposes, the faces are assigned a numerical value from 0 to 5. (In the study, the faces

Table 1. Comparison of Scales

Overall Preference, Validity, and Reliability

	Type of Scale					
	SDS	0-10	Faces	Glasses	Chips	Colors
Preference[a]	625 (6)	558 (5)	311 (1)	484 (4)	420 (3)	408 (2)
Validity[b]	62.81 (3)	60.00 (5)	60.43 (4)	63.70 (2)	69.06 (1)	58.39 (6)
Reliability[c]	72.73 (5)	75.44 (2)	74.24 (4)	75.38 (3)	77.27 (1)	68.18 (6)

[a]$\chi^2 = 135.81$, df = 5, $P < .001$
[b]$\chi^2 = 1.21$, df = 5, NS
[c]$\chi^2 = .65$, df = 5, NS

Numbers in parentheses indicate rank order of scales; 1 indicates highest rank.

Preference, Validity, and Reliability (Ages 3-7)

	Type of Scale					
	SDS	0-10	Faces	Glasses	Chips	Colors
Preference[a]	235 (6)	190 (5)	98 (1)	133 (2)	134 (3)	149 (4)
Validity[b]	48.15 (3)	35.48 (6)	48.89 (2)	46.51 (4)	64.44 (1)	39.53 (5)
Reliability[c]	54.14 (4)	66.67 (2)	61.11 (3)	72.22 (1)	55.56 (5)	44.44 (6)

[A]$\chi^2 = 75.79$, df = 5, $P < .001$
[b]$\chi^2 = 9.89$, df = 5, NS
[c]$\chi^2 = 7.92$, df = 5, NS

Numbers in parentheses indicate rank order of scales; 1 indicates highest rank.

Preference, Validity, and Reliability (Ages 8-12)

	Type of Scale					
	SDS	0-10	Faces	Glasses	Chips	Colors
Preference[a]	204 (6)	197 (5)	113 (1)	189 (4)	146 (3)	138 (2)
Validity[b]	66.00 (3)	64.00 (4)	60.00 (5)	68.00 (2)	72.00 (1)	66.00 (3)
Reliability[c]	75.00 (4)	83.33 (3)	87.50 (2)	83.33 (3)	91.67 (1)	66.67 (5)

[a]$\chi^2 = 42.16$, df = 5, $P < .001$
[b]$\chi^2 = 1.21$, df = 5, NS
[c]$\chi^2 = 5.06$, df = 5, NS

Numbers in parentheses indicate rank order of scales; 1 indicates highest rank.

Preference, Validity, and Reliability (Ages 13-18)

	Type of Scale					
	SDS	0-10	Faces	Glasses	Chips	Colors
Preference[a]	186 (6)	171 (5)	100 (1)	162 (4)	140 (3)	121 (2)
Validity[b]	68.18 (4)	72.73 (2)	72.73 (2)	76.19 (1)	70.45 (3)	68.18 (4)
Reliability[c]	75.00 (3)	70.83 (4)	70.83 (4)	69.57 (5)	79.17 (2)	87.50 (1)

[a]$\chi^2 = 35.76$, df = 5, $P < .001$
[b]$\chi^2 = .73$, df = 5, NS
[c]$\chi^2 = 3.16$, df = 5, NS

Numbers in parentheses indicate rank order of scales; 1 indicates highest rank.

were arranged in a circular format and letter codes were used to designate a numerical value. These modifications were instituted to minimize the tendency to choose the same location or number along a horizontal figure. See discussion of strengths and limitations.)

The *glasses scale* (see Figure 4) is a variation of the visual analogue scale, a scale which uses a 10 cm-line with the end points designated as "no pain" and "worst pain," but no other divisions marked. The patient places a mark at some point on the line to indicate the pain intensity. A numerical value is assigned by measuring the distance in centimeters from the end point of no pain to the patient's mark. The child's version consists of 6 cylinders or "glasses." The first cylinder is empty and represents "no pain." The other five cylinders are filled with increasing amounts of "pain." The completely filled cylinder is the "worst or most pain." The child is shown these "glasses" and asked to choose the glass with as much pain as he/she feels. For statistical purposes, the glasses are assigned a numerical value from 0 to 5.

The *chips scale* uses five white plastic chips. These chips are compared to pieces of hurt: one chip is a "little hurt" and five chips are the "most hurt." No chips represent "no pain." The child chooses the number of chips he/she feels equals his/her pain. The number chosen is the score recorded for statistical purposes.

The *color scale* is a modification of the Eland Color Scale. In the adapted version, the child is given six crayons or markers (black, purple, blue, red, green, and orange) and asked to arrange them from a color that is like "no hurt" to the color that is like the "worst or most hurt." The child then chooses the color that most nearly is like the pain felt. When the colors are ranked, a numeric value of 0 to 5 is assigned to the colors.

Data Analysis

Preference scores were determined by assigning a score of 1 to 6 for the ranking of most to least preferred (the lower the score, the higher the preference). The sum of scores for each preference ranking is given in Table 1.

Concurrent validity was determined by the following procedure:

1. The ranking of painful events by each subject was compared with the ranking of pain scores for each pain scale to determine the consistency (validity) of each pain scale.
2. Each pain scale which showed a consistent response according to step one was given a score of one; otherwise it was given a score of zero.
3. The number of consistent responses for each pain scale was totaled for each age group.
4. The number of consistent responses for each pain scale was divided by the total number of subjects in each age group to arrive at a percentage of consistent responses (see Table 1).

Reliability was determined using the same approach as for validity except that the pain ratings for the painful events on the first test were compared with the pain ratings on the retest. The chi square was used to test the null hypothesis that there were no differences between preference, validity, and reliability of the six scales. The alpha level was $p<.05$.

The chi squares for preference ranking for each age group and overall were statistically significant at $p<.001$, thus rejecting the null hypothesis. Significant differences do exist between preference ranking of the pain scales. The most preferred scale for all age groups was the faces scale. For children ages 8 to 18 years, the faces scale was followed by the colors, chips, glasses, numeric, and simple descriptive scales. In the 3-to-7-year age group, the preference order was the same, except for the colors and glasses scales, which were ranked fourth and second, respectively.

The chi square was not statistically significant at $p<.05$ for differences in validity or reliability. Therefore, the null hypothesis was not rejected. No significant differences exist among the scales or for any age group. However, the raw data indicated that the scale with the highest validity for all the age groups except 13 to 18 years was the chips scale. In the 13-to-18 age group, the glasses scale had the highest validity. The scales with the highest reliability were chips scale for the age group 8 to 12 years and overall, glasses scale for ages 3 to 7 years, and colors scale for ages 13 to 18 years. With all scales, validity increased with advancing age (see Figure 5). However, reliability increased only from the 3-to-7-year age group to the 8-to-12-year age group. Reliability decreased in the 13-to-18-year age group for all the scales except the color scale and the simple descriptive scale, which continued to increase or remain constant respectively (see Figure 6).

The colors chosen for pain ratings were analyzed using a frequency table. No one color scale predominated; color scales often differed in a child's test and retest. Although every color was used for every pain rating, the color chosen most often for "least pain" was orange and for "most pain" black. The chi square was significant at $p<.001$ for the choice of least and most pain colors for the overall age group. Children's favorite colors also showed variable relationship to choice of pain colors. For example, orange was both the least pain color and least favorite color, but black was the most pain color and the third least favorite color (see Table 2).

The painful events were analyzed using a frequency table. The subjects reported a total of 116 different painful events (77 procedures and 39 bodily symptoms). The average number of total painful events was 3 per child and the percent of bodily symptoms to total number of painful events was 22%. However, age and diagnosis influenced the number and type of painful events. There was a trend toward decreasing pain rating with age for procedure pain and increasing pain rating for bodily pain. Children with orthopedic conditions had a higher average number of painful events (3.8) and a higher percentage of bodily symptoms (41%), than children in most other categories (see Table 3). Only ear, nose, and throat conditions demonstrated a higher percentage of bodily symptoms (42%), but the sample size was too small (only 4 subjects) to yield reliable data.

The most commonly reported painful events were venipuncture for drawing blood, insertion of peripheral intravenous lines, injections, stomach hurting, leg pain, removal of peripheral intravenous lines, pain when moved, postoperative pain, head pain, and fingersticks (see Table 4).

Of all the procedures listed, those identified as painful (venipuncture for drawing blood, insertion of peripheral intravenous lines, injections, and fingersticks) were also the most frequently performed. However, these procedures were not necessarily associated with the greatest intensity of pain. Bodily symptoms, such as postoperative pain, pain when moved, and leg pain (usually from traction/pin), and procedures such as chest tube insertion, arterial puncture for blood gas sampling and insertion of subclavian lines, spinal tap, and bone marrow test were associated with higher ratings of pain (see Table 4).

In addition, not all children universally perceived procedures as painful. For example, of the 141 children who experienced venipunctures for blood sampling, only 85 (60%) rated it as painful. Even children who had experienced procedures associated with

Figure 5. Effects of Age on Validity of Pain Scales
Key: SDS = simple descriptive; N = numeric; F = faces; G = glasses; CH = chips; CO = color.

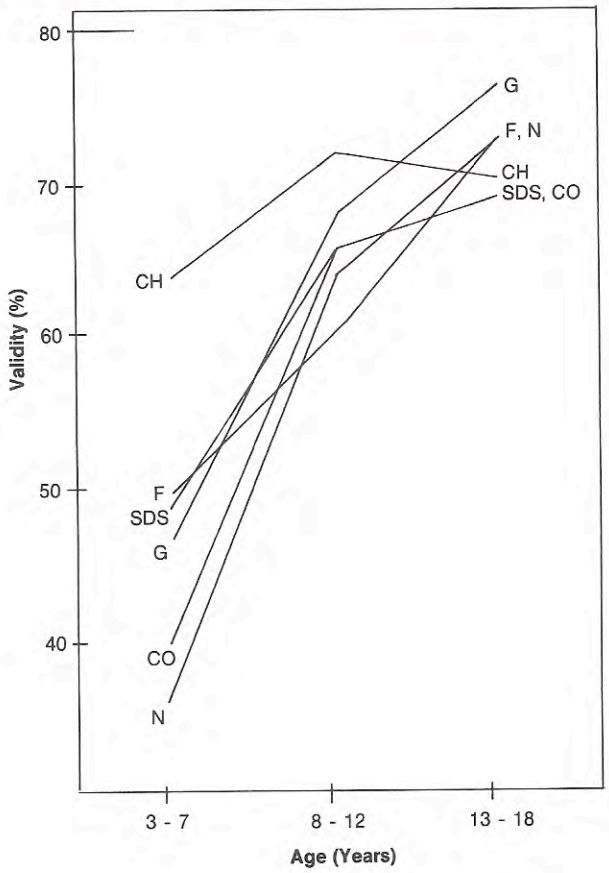
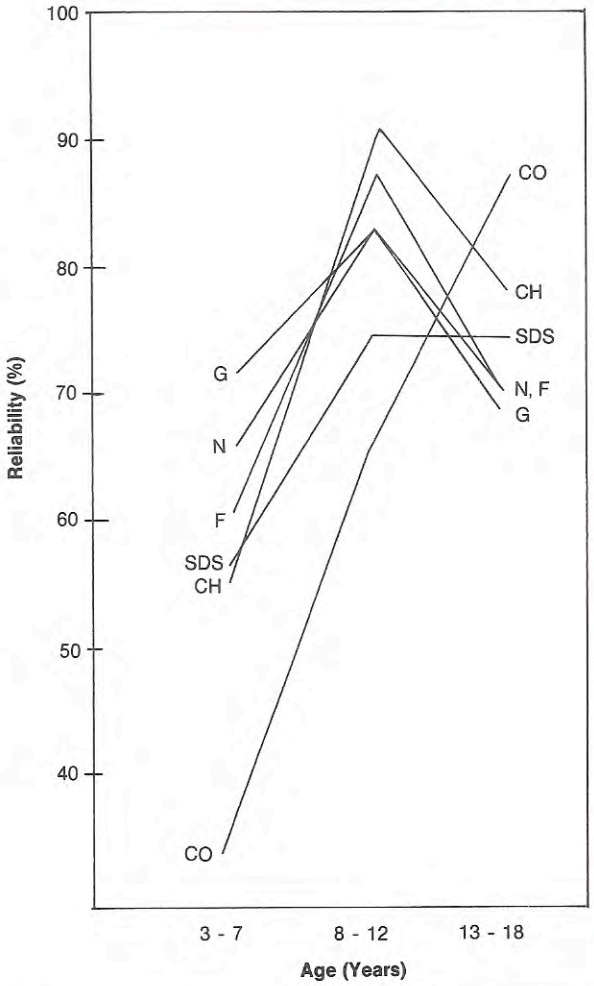


Figure 6. Effects of Age on Reliability of Pain Scales
Key: SDS = simple descriptive; N = numeric; F = faces; G = glasses; CH = chips; CO = color.



higher intensity pain, such as spinal taps or bone marrow tests, did not always report them as painful events. The only procedure consistently reported as painful was arterial puncture.

There were no sex differences in pain rating of the events. The number of painful events experienced during hospitalization did not influence the identification or rating of perceived painful procedures or bodily pain. Children who had had spinal taps or bone marrow tests were just as likely to report that venipunctures or injections hurt as children who had not experienced these more traumatic tests.

Discussion and Clinical Application

The findings indicate that children ages 3 to 18 years clearly prefer the faces scale over the other scales but that no one scale demonstrates superiority in validity or reliability. Until additional research is undertaken to refine pain assessment scales, it seems appropriate to use the faces scale. Studies on adults' pain scale preference demonstrated that preference did not influence their pain intensity report (Kremer, Atkinson, & Ignelzi, 1981).

The finding of an increase in validity and reliability with age is consistent with children's advancing cognitive ability. However, the decrease in reliability at age 12 is puzzling. One possible explanation may be related to the investigators' perception that the interest of older children decreased during the retest. Therefore, the older subjects may have been less motivated to rate the pain accurately than young children who enthusiastically enjoyed the testing procedure. It may also be that young children remembered the pain more acutely than older children. Obviously, more research is needed to answer the question of declining reliability with age beyond 12 years.

The choice of pain color differed from findings in other studies. Red, the most common color for severest pain in other research, was the second most common in this study. Orange, the most common color selected for least pain by these subjects, was not chosen similarly in other studies. It should be noted that yellow, a least pain color in another study, was not one of the colors children could select in this study. (The colors used in this study were identified from a pilot study in which children were asked to select six favorite colors from eight colors that originally included yellow and brown.) The variability in choice of favorite color and pain colors casts doubt on any definite relationship between the color a child will select as the favorite color and a pain color. Exactly what the choice of colors for rating pain means is not clear, except that there exists considerable latitude on the construction of a pain scale using colors. Of importance when choosing pain scales was the finding that two males were unable to use this instrument because of color blindness and three of the eight children ages 3 years could not name the colors.

The finding of invasive procedures

Table 2. Frequency of Colors Chosen as Least Pain, Most Pain, and Favorite Color.

Colors	Least Painful	Most Painful	Favorite Color
Ages 3-7			
Black	14	13	4
Blue	12	11	10
Red	8	12	16
Orange	12	6	3
Green	10	9	10
Purple	8	13	19
Ages 8-12			
Black	5	43	11
Blue	7	3	25
Red	6	30	15
Orange	34	0	0
Green	15	2	4
Purple	22	11	2
			Pink-1
Ages 13-18			
Black	5	52	2
Blue	6	1	21
Red	6	16	18
Orange	40	1	0
Green	11	0	2
Purple	2	0	17
			Yellow-1
			White-1
Total[a]			
Black	19	108	17
Blue	25	15	56
Red	20	58	49
Orange	86	7	3
Green	36	11	16
Purple	32	24	38
			Yellow-1
			White-1
			Pink-1

NOTE: Frequency of colors include those chosen for test and retest. Decreased frequency of favorite color reflects subjects who stated no preference.
[a]χ^2 for least pain colors = 216, df = 5, $p < .001$.
χ^2 for most pain colors = 194.14, df = 5, $p < .001$.

Table 3. Analysis of Painful Events by Diagnosis

Diagnosis	Total number of subjects	Average number of painful events	Percent of bodily symptoms[a]
Orthopedic	33	3.8	41
Cardiac	6	3.5	19
Cancer	2	3.5	0
Gastrointestinal	25	3.4	26
Neurologic	11	3.2	28
Renal/genitourinary	11	3.1	29
Otolaryngologic	4	3.0	42
Pulmonary	23	2.7	27
Dermatologic	9	2.6	26
Endocrine	9	2.2	0

[a]Percent of bodily symptoms to total number of painful events

Table 4. Reported Painful Events and Pain Rating

Painful Events (in order of reported frequency)[a]	**Pain Rating**
Venipuncture (blood drawn) (85/141)[b]	2.7
IV Insertion (75/110)	2.9
Injections (56/66)	2.5
Stomach Hurt (20)	2.8
Leg Pain (15)	3.2
IV Removal (13/63)	2.0
Pain when moved (11)	2.9
Post-operative pain (11)	3.5
Head Pain (10)	2.8
Arterial Puncture (9/9)	4.0
Fingerstick (8/22)	2.0
Chest Tube Insertion (2/4)	4.7
Spinal Tap (3/6)	3.9
Bone Marrow Test (2/3)	3.7

[a]Reported more than five times except for last three items.
[b]Numbers in parentheses indicate number of reported painful events/total number of children experiencing procedure during hospitalization.

Without methods to quantitatively assess pain in children, it is impossible to plan appropriate interventions and plan their effectiveness.

being most frequently listed as painful is consistent with other research. However, the identification of bodily symptoms as a common painful event was unexpected. It is possible that the discrepancy between these findings and those of other studies was due to different research methods. This study specifically requested children to identify both painful procedures and painful areas on their body. Other studies may have limited their investigation to procedures. The variability in pain rating of procedures is similar to at least one other study that found that 25% of children reported they did not require help during procedures such as spinal taps (Zelter & LeBaron, 1982).

The findings related to children's perception of painful events has several implications for health professionals. First, *the perception of pain is very individualized.* We cannot assume that certain procedures will or will not be perceived as painful by children. This finding lends support to the recommendation by Olness (1981) that instead of stating that a procedure may or may not hurt, explain that a procedure feels different to different children and ask the child to tell you how it feels. This approach avoids suggesting or "planting" the idea of pain, allows for variation in sensory perception, and gives children control in describing their reactions (Baker & Wong, 1987).

The findings also suggest that contrary to common belief, *children do not become accustomed to pain.* Children who had had numerous painful procedures were just as likely to report that venipunctures or injections hurt as children who had not experienced traumatic tests such as bone marrow tests. This is consistent with the findings of Katz, Kellerman, and Siegel (1980), who found that children do not habituate or adapt to the discomfort from repeated procedures and to experience increasing, not decreasing, levels of pain.

There is clear evidence that *procedures involving needles are considered painful by children.* Consequently, interventions need to be developed that eliminate or minimize the discomfort of common procedures such as venipunctures, injections, and fingersticks (Lutz, 1986). Although several studies have investigated effective interventions that reduce pain associated with invasive procedures (Clarke & Radford, 1986; Eland, 1981b; Fernald & Corry, 1981; Fowler-Kerry & Lander, 1987; Zelter & LeBaron, 1982), these strategies are rarely employed in practice.

Findings from this study also suggest that *children's pain is not effectively managed,* especially for children with certain conditions such as orthopedic problems. Also, almost all the injections reported as painful were for pain medication! With other available methods of delivering analgesics, such as oral and intravenous routes, it is most unfortunate that a painful event is inflicted on children in an effort to relieve their pain.

Strengths and Limitations

The large sample size for the total number of subjects was a strength. However, each year of age was composed of less than 10 children, making any analysis of individual age differences difficult. Further research is needed on larger numbers of children, especially in the age group 3 to 7 years, to determine if reliability and validity differ among the individual ages. Ideally, larger numbers of children should have been retested, but early discharge made this impossible.

A possible limitation was the assumption that children's ranking of the painful events was a valid estimate of their perception of pain. This assumption was the basis for validity testing and if incorrect would invalidate the findings. However, there is no way of proving that pain exists other than believing the person in pain (McCaffery, 1979).

Another limitation might have been the circular format of the faces scale, which was so designed to decrease the tendency of children to consistently choose the same rating position along a horizontal line. However, the circular format may have confused some children. Consequently, additional research is needed to determine if a horizontal format improves the reliability or validity of the faces scale.

While this study was limited to children, additional research with adults, especially the elderly and non-English-speaking individuals, may find the faces scale a valid and reliable alternative to the simple descriptive, numeric, and visual analogue scales. PEDI

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