AN INTRUSIVE IMPACT OF ANCHORS IN CHILDREN'S FACES PAIN SCALES

by

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B.Sc. Dalhousie University, 1996

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF

THE REQUIREMENTS OF THE DEGREE OF

MASTER OF ARTS

in

THE FACULTY OF GRADUATE STUDIES

DEPARTMENT OF PSYCHOLOGY

We accept this thesis as conforming to the required standard

THE UNIVERSITY OF BRITISH COLUMBIA

May, 1998

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Date May 26th / 1998

DE-6 (2/88)

Abstract

The numerous pain rating scales using faces depicting varying degrees of distress to elicit reports of pain from children fall into two categories; those with a neutral face as the 'no pain' anchor, and those with a smiling face as the 'no pain' anchor. This study examined the potentially biasing impact of these anchor types on children's self-reports of pain in response to a series of vignettes. Participants were 100 children stratified by age (5-6 years, 7-8 years, 9-12 years) and randomly assigned to one of three groups: 1) neutral scale/sensory instructions; 2) smiling scale/sensory instructions; 3) smiling scale/affective instructions. Children completed a faces scale, a visual analogue scale (VAS), and emotions ratings in response to four scenarios depicting: 1) no pain/negative emotions; 2) pain/negative emotions; 3) no pain/positive emotions; 4) pain/positive emotions. Results showed that children who used the smiling scale had significantly higher pain scores for no pain and pain/negative emotions vignettes, and significantly lower faces scale scores for pain/positive vignettes, than children who used the neutral faces scale. Instructions varying in focus on sensory or affective qualities of pain had no effect on children's pain ratings. Group differences in children's ratings with the VAS and emotions measure suggested that rating pain with a smiling faces scale may alter a child's concept of pain. Age differences indicated the younger children rated the negative emotion vignettes as more painful than the older children. These findings suggest that children's pain ratings vary depending on the types of faces scale used, and that faces scales with smiling anchors may confound affective states with pain ratings.

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Acknowledgements

I would like to thank my committee members, Drs. Wolfgang Linden, Lawrence Walker, and Geoff Hall for their time and constructive comments. I would also like to thank my thesis advisor, Dr. Kenneth Craig, for his valuable feedback and support during the course of this research.

I also would like to gratefully acknowledge Ms. Christine Lilley and Ms. Cheryl Gilbert for their helpful suggestions, Ms. Rekha Morbia for her assistance in developing the vignettes used in the study, Ms. Michelle Mathias for her assistance with data entry, and, finally, the staff and students of Trimble After-School Care, Tennyson Out-of-School Care, Shaughnessy-Point Grey Child Care, Lord Roberts YMCA, Mount Pleasant YMCA, and Kerrisdale YMCA for their participation in this research.

I was supported by a University Graduate Fellowship from the University of British Columbia during the course of this research, and funding for this study was provided by a research grant from the Social Sciences and Humanities Research Council of Canada (SSHRC) awarded to Dr. Craig.

An Intrusive Impact of Anchors in Children's Faces Pain Scales

Children experience difficulty with the abstract task of describing subjective experiences using verbal language, but do better matching internal states with pictorial representations of emotions (Sattler, 1992). In consequence, current popular measures elicit self-reports of pain from children by asking them to match their experiences of pain with appropriate pictures of children's facial expressions (Kuttner & LePage, 1989). These faces scales show a series of faces, typically hand-drawn, with faces graded in increasing intensity between 'no pain' and 'worst pain possible' (e.g., Beyer, 1984; Bieri et al., 1990; Douthit, 1990; Frank et al., 1982; Goddard & Pickup, 1996; Kuttner & LePage, 1983; LeBaron & Zeltzer, 1984; Lehmann et al., 1990; Maunuksela et al., 1987; McGrath et al., 1985; Pothmann, 1990; Smith & Covino, 1985; Tyler et al., 1993; Wong & Baker, 1988). Faces pain scales tend to be preferred by children, parents, and nurses, when compared with other assessment tools including visual analogue scales and word descriptor scales (Fogel-Keck et al., 1996; West et al., 1994; Wong & Baker, 1988).

There has been considerable debate among researchers and clinicians in the field of pediatric pain as to which form of the faces pain scale provides the most reliable and valid measure of a child's self-report of pain. The numerous faces pain scales currently used can be grouped into two categories, depending upon whether they use a neutral face (e.g., Bieri et al., 1990) or a smiling face (e.g., Wong & Baker, 1988) as the 'no pain' anchor. The use of an emotionally laden anchor cue provokes concern as to whether these scales measure pain or non-painful, but aversive, affect (i.e., the emotional aspect of hurting or the non-nociceptive but distressing state of fear or anxiety that often accompanies painful experiences) (Chambers & McGrath, 1998; Kuttner & LePage, 1989; Wong, 1994). The instructions that typically accompany scales with a smiling face as the 'no pain' anchor describe the faces as "happy" or

"sad" (Wong & Baker, 1988). However, children who are not in pain are not necessarily happy; hence, there is a risk of "false positive" pain in unhappy children who are not in pain. Similarly, pediatric pain researchers are concerned with "false negatives", as scales with a smiling face as the 'no pain' anchor appear to confound the construct of "feeling happy" with being "pain-free". Indeed, there have been reports of young children confusing "hurting" with "feeling". For example, in a day surgery study using the Wong and Baker (1988) faces scale, Robertson (1993) found that, when tested *pre*operatively, many children who were anxious about the surgery pointed to faces other than the smiling 'no pain' face, despite being pain-free. Similarly, they found that, *post*operatively, children sometimes pointed to the smiling 'no pain' face despite being in obvious pain. Robertson (1993) speculated that the prospect of going home outweighed the pain associated with surgery. Consequently, confounding non-nociceptive affect with pain on a faces pain scale may lead to ambiguous measurement outcomes, particularly for younger children and others who think concretely or confuse pain with feelings of anxiety and loneliness.

In support, research on the nature of emotions has shown that positive and negative affect consistently emerge as two dominant and relatively independent dimensions (Watson & Clark, 1988), and hence both positive and negative anchors should not be used within the same scale.

The challenge confronting children when attempting to communicate pain reflects the complexities of their experience. Pain is a multidimensional phenomenon comprising both sensory and affective components (Merskey & Bogduk, 1994). Research from a developmental perspective indicates that pediatric pain assessment would be a considerable challenge because differentiating simultaneous subjective states (e.g., pain, anxiety) is a difficult developmental task for children under the age of 10 (Gross & Ballif, 1991). Hence, it is likely that a younger, hospitalized child who is distressed but <u>not</u> in pain might accurately point to the first face if given

a scale with a neutral face as the 'no pain' anchor. However, if given a scale with a smiling face as the 'no pain' anchor, where the faces not only depict pain but variations in emotional state (i.e., happy or sad), s/he might mistakenly point to a face towards the middle of the spectrum as s/he is not "happy", giving the impression pain is present when it is not.

Despite the unfortunate potential consequences of false positives or negatives, there has been no empirical demonstration showing one form of faces scale to be superior to another. The primary purpose of the present study was to compare age-related differences in children's self-reported levels of pain in response to a series of hypothetical vignettes, varying on both sensory and affective dimensions, using two types of faces pain scales, varying in whether the 'no pain' anchor of the scale was a smiling face or a neutral face. Because the research findings and illustrations provided above indicate emotional and mood states accompanying pain are often dictated by the social and physical contexts in which pain is experienced, the vignettes varied in whether the setting evoked negative or positive emotions in the child. As the scale with the smiling face as the 'no pain' anchor represents a more complex emotional array in contrast to the scale with the neutral face as the 'no pain' anchor, and requires children to evaluate not only the sensory component of their pain experience but the affective component as well, it was predicted that pain ratings would be shifted as follows:

- in situations with *negative* emotions and *pain*, the scale with the smiling face as the 'no pain' anchor will yield pain ratings that are significantly *higher* than the scale with a neutral face as the 'no pain' anchor.
- in situations with *positive* emotions and *pain*, the scale with the smiling face as the 'no pain' anchor will yield pain ratings that are significantly *lower* than the scale with a neutral face as the 'no pain' anchor.

- in situations with *negative* emotions and *no pain*, the scale with the smiling face as the 'no pain' anchor will yield pain ratings that are significantly *higher* than the scale with a neutral face as the 'no pain' anchor.
- in situations with *positive* emotions and *no pain*, there will be *no significant differences* in pain ratings between faces scales with neutral or smiling faces as the 'no pain' anchors.

It was also noted that the words used to describe the anchors on the two types of scales may impair a child's ability to provide an accurate self-report of pain. Consequently, three groups were included in this study: 1) one group of children (NS) received the neutral 'no pain' faces scale with sensory-oriented instructions that referred to the faces as either being in pain or not, and did not refer to the faces as "happy" or "sad"; 2) one group of children (SS) received the smiling 'no pain' faces scale with the same sensory instructions; and 3) one group (SA) received the smiling 'no pain' faces scale with the affective instructions that typically accompany the Wong and Baker (1988) scale, describing the faces as "happy" or "sad". It was expected that children's pain ratings in the third group would be most affected for each of the hypothetical pain situations, followed by children in the second group, and then the first group. Two comparison measures were included in this study, a visual analogue scale (VAS) for pain ratings, and an emotions checklist. It was expected that there would be no group differences in children's VAS and emotions scores.

Based on research demonstrating age differences in children's self-reports of pain (Fradet et al., 1990; Goodenough et al., 1997; Lander & Fowler-Kerry, 1991), it was expected that younger children would report that the situations described in the vignettes would be more painful than older children. In addition, it was expected, based on research showing a

developmental progression in children's ability to recognize simultaneous emotions, that the hypothesized group differences described above would be more marked among younger children (i.e., 5- to 6-year-olds, and 7- to 8-year-olds) than older children (i.e., 9- to 12-year-olds) who, due to their increased cognitive abilities, would be less susceptible to biases introduced by the scale with the smiling face as the 'no pain' anchor.

Method

Participants

Participants were 5- to 12-year old children recruited from child care centres in Vancouver, B.C. The children (49 male, 51 female) were stratified into three age categories: 5-6 years, $\underline{n}$ = 32 (13 male, 19 female); 7-8 years, $\underline{n}$ = 34 (18 male, 16 female); 9-12 years, $\underline{n}$ = 34 (18 male, 16 female). These age categories are consistent with a developmental progression in children's understanding of pain (McGrath & McAlpine, 1993). The children were randomly assigned to one of three groups; 1) neutral scale/sensory instructions, $\underline{n}$ = 34 (15 male, 19 female); 2) smiling scale/sensory instructions, $\underline{n}$ = 32 (14 male, 18 female); 3) smiling scale/affective instructions, $\underline{n}$ = 34 (20 male, 14 female). This study was approved by the University of British Columbia Behavioural Research Ethics Committee and the directors of the participating child care centres. Written informed consent was obtained from parents and written assent was obtained from children. Based on the locations of the various centres and discussions with the day care directors, children came from a variety of socioeconomic and ethnic backgrounds.

Procedure

Letters describing the study were sent home with children to their parents (Appendix A). Parents were asked to complete and return the letter within a week indicating whether they were

interested in allowing their child to participate in the study. To maximize the return of signed consent forms, children received a colourful pencil simply for bringing back the form, regardless of whether their parent allowed them to take part in the study or not. Of the 193 children whose parents were sent home a letter about the study, 129 letters were returned. Of the 129 letters that were returned, 20 parents declined to allow their child to take part, 6 children whose parents had consented were unavailable for testing (e.g., due to illness, doctor's appointments), and 3 children were excluded from the study as they did not speak English sufficiently well to participate. Thus, 100 children participated in the study. After receiving written assent from the children (Appendix B), they were tested individually in a quiet area of their day care centre, and were shown a series of twelve hypothetical cartoon vignettes in a random order (described below). For each vignette, children were asked to rate pain, using a faces pain scale, a visual analogue scale, and emotion ratings. The order in which the pain and emotion measures were presented was randomized within each vignette. The testing situation took approximately 15 minutes per child.

Measures

Faces pain scales. Children completed one of two, 5-point, faces pain scales created for use in this study (Appendix C). The scales ranged from either a neutral or a smiling face as the 'no pain' anchor to a downturned mouth, 'worst pain possible' face. The downturned mouth was used, in contrast to a more open-mouthed expression, as research examining children's own drawings of different degrees of pain has shown that a shift toward a mouth, downturned at the ends, is a principal signal of a change in pain among children (Bieri et al., 1990). In addition to the mouth expression, two simple dots were used to indicate eyes for all faces in both scales. To maintain a simplistic form, the faces were devoid of any other facial features (e.g., eyebrows, nose, tears). With respect to the reliability of these scales, the five faces from each of the two

scales were correctly rank ordered from least painful to most painful by 96% of a pilot sample (n = 50 undergraduates). With respect to concurrent empirical validity, in the current study, correlations between scores on each of the faces scales and scores on the VAS ranged from r = .13 to .80 (median correlation, r = .67).

The faces pain scales, when presented to the children, were accompanied by one of two possible sets of instructions (Nix et al., 1993) that were repeated to the child after every fourth vignette:

- Sensory-oriented instructions: "Each of these faces is for a person who has no hurt or pain, or some, or a lot of hurt or pain. This first face doesn't have any hurt or pain at all. The next face has just a little bit of hurt or pain. Each of the next faces hurts a little more, until you get to this last face, who has as much hurt or pain as you can imagine. Circle the face that best shows how much hurt or pain you think [name of child in vignette] feels."
- Affective instructions: "Each of these faces is for a person who feels happy because they have no hurt or pain, or sad because they have some or a lot of hurt or pain. This first face is very happy because it doesn't have any hurt or pain at all. The next face has just a little bit of hurt or pain. Each of the next faces hurts a little more, until you get to this last face, who has as much hurt or pain as you can imagine. Circle the face that best shows how much hurt or pain you think [name of child in vignette] feels."

Emotions. Each child was asked to rate how happy, sad, excited, angry, calm/relaxed, scared/afraid, and nervous/worried the child in each of the vignettes would feel on a 4-point rating scale (0 = "not at all" and 3 = "really") (Appendix D). Positive emotions were reverse

coded and responses were averaged to yield a total score for negative emotions. This scale has good reliability and validity (Chambers et al., 1996; Reid et al., in press). Internal consistencies in the current study ranged from α = .45 to .93 (median α = .78).

Visual analogue scale (VAS). Children also rated the level of pain associated with each of the vignettes using a 100 mm visual analogue scale (VAS) ranging from "No Pain" to "Very Severe Pain" (Huskisson, 1974) (Appendix E).

Development of the Children's Pain Vignettes

For the purposes of this study, cartoon pictures were developed that depicted situations commonly encountered by school-age children. The vignettes were similar to those previously developed by Belter et al. (1988) and Adesman et al. (1992); however, the vignettes developed for the current study varied on both sensory (i.e., no pain vs. pain) and affective (i.e., positive vs. negative emotions) dimensions. Consequently, there were four types of situations: 1) no pain/negative emotions (e.g., not being picked up after school, going on a scary roller coaster, waking up in a thunder and lightning storm); 2) pain/negative emotions (e.g., getting a needle at the doctor's, being stung by a bee, falling down the stairs); 3) no pain/positive emotions (e.g., getting a good mark at school, getting lots of birthday presents, going to a movie); 4) pain/positive emotions (e.g., finally getting an ear pierced, spraining an ankle but winning a race, having an operation but getting to go home). A pool of approximately 30 items was initially developed and then tested on a pilot sample (n = 50). Based on an item analysis (i.e., an examination of means and standard deviations) of each of the 30 vignettes, 12 vignettes (3 vignettes for each of the four categories) were chosen for use with the children. The final, selected vignettes were drawn in cartoon form similar to Belter et al. (1988) (Appendix F). The drawings contained a central figure of a young child, nonspecific with regard to gender and

lacking any facial expression. The pictures were accompanied by a verbal story that described the action taking place in the picture. Males heard verbal stories with a boy's name, while females heard stories with a girl's name (e.g., "This is Jenny/Johnny. S/he hates getting needles. S/he is getting a needle at the doctor's office."). The scores for each of the children's faces scale, VAS, and emotions ratings were averaged across the three vignettes in each category to provide mean scores for each of the four vignette types. In the current study, internal consistencies for each of the four vignette types, for pain scores and emotions scores, respectively, were as follows: 1) no pain/negative emotions, α = .92 and .76; 2) pain/negative emotions, α = .85 and .78; 3) no pain/positive emotions, α = .35 and .45; 4) pain/positive emotions, α = .70 and .64; These are similar in magnitude to those reported by Belter et al. (1988). The lower internal consistencies for the no pain/positive emotions vignette type can be attributed to the very low variability in children's ratings for these vignettes (i.e., almost all children perceived these vignettes to represent no pain and very positive emotions), thus limiting the magnitude of the correlations, rather than a lack of consistency among the vignettes in this set (Carroll, 1961).

Results

Statistical Analyses

Faces pain scale, VAS, and emotions scores were entered separately into a series of 3 X 3 (group X age) between-subjects analyses of variance (ANOVAs), testing for effects of group (1 = neutral scale/sensory instructions vs. 2 = smiling scale/sensory instructions vs. 3 = smiling scale/affective instructions), age (5-6 years vs. 7-8 years vs. 9-12 years), and their interactions for each of the four different vignette types. Simple main effects analyses and Student Newman Keuls post-hoc tests were used to follow-up significant interactions and group differences. Because VAS data were missing from $\underline{n}$ = 8 children who did not understand the measure well

enough to use it, data were analyzed using separate ANOVAs, rather than together in a multivariate analysis of variance (MANOVA) to avoid the exclusion of the faces scale and emotions data from those subjects. Alpha was adjusted to .01 to control for multiple statistical procedures. Vignette type was not included as a factor in the analysis, as we desired to provide a description of the potential age and scale group differences occurring independently for each of the four types of situations.

The means and standard deviations for the main effects of group and age on faces scale, VAS, and emotions scores for the four different vignette types are presented in Tables 1 and 2.

No Pain/Negative Emotions

For vignettes with negative emotions and the absence of pain (e.g., waking up in a thunder and lightning storm), the ANOVA on faces scale ratings showed that there was a significant main effect of group, $F(2, 91) = 58.88$, $p<.001$, with children using face scales with smiling anchors in both Groups 2 (SS) and 3 (SA) having significantly higher scores than children in Group 1 (NS). Type of instruction had no impact on ratings. The ANOVA also showed a main effect of age, $F(2, 91) = 5.91$, $p<.01$, with younger children's (i.e., 5-6 year-olds) faces scale ratings indicating that they perceived these vignettes as more painful than the oldest children (i.e., 9-12 year-olds) but not the 7-8 year-olds. The group X age interaction was not significant, $F(4, 91) = 2.98$, $p>.01$.

The ANOVA on VAS scores showed a significant main effect for group, $F(2, 83) = 14.16$, $p<.001$, with children in both Groups 2 (SS) and 3 (SA) having significantly higher VAS scores than children in Group 1 (NS). The ANOVA also showed a significant main effect of age, $F(2, 83) = 5.13$, $p<.01$. Again, 5-6 year-old children perceived these vignettes as more painful, using the VAS, than 9-12 year-old children, but not 7-8 year-old children. The group X age

interaction was not significant, $F(4, 83) = 1.42$, $p > .10$.

The ANOVA on emotions scores revealed that there were no significant main effects of group, $F(2, 91) = .01$, $p > .25$, or age, $F(2, 91) = 3.21$, $p > .01$. The group X age interaction was also not significant, $F(4, 91) = .81$, $p > .50$. All the children had similar emotions ratings for the vignettes.

Pain /Negative Emotions

When pain was accompanied by negative emotions (e.g., getting a needle at the doctor's), the ANOVA showed a significant main effect for group, $F(2, 91) = 47.92$, $p < .001$ and age, $F(2, 91) = 7.34$, $p < .01$; however, these main effects were subordinate to a significant two-way interaction between group and age, $F(4, 91) = 6.44$, $p < .001$. Figure 1 illustrates this interaction. There were simple main effects of group among 9-12 year-old children, $F(2, 31) = 31.37$, $p < .001$ and 7-8 year-old children $F(2, 31) = 44.27$, $p < .001$, but not 5-6 year-old children, $F(2, 29) = 1.53$, $p > .10$. That is, among 7-12 year old children, those using the smiling faces scales (i.e., Groups 2 (SS) and 3 (SA)) rated these vignettes as significantly more painful than children who used the neutral faces scale (i.e., Group 1 (NS)). Pain ratings by the younger group were similar regardless of the type of scale used.

The ANOVA on VAS scores showed a significant main effect for group, $F(2, 73) = 13.85$, $p < .001$. Again, children in the smiling faces scale groups (SS and SA) rated pain, using the VAS, as significantly higher than children in the neutral faces scale group. The main effect for age was not significant, $F(2, 73) = 3.13$, $p > .05$ (i.e., VAS ratings were similar regardless of age group), as was the group X age interaction, $F(4, 73) = 1.41$, $p > .10$.

The ANOVA on emotions scores showed that there was a significant main effect of age, $F(2, 90) = 8.41$, $p < .001$, with 5-6 year-old and 7-8 year-old children rating these vignettes as

more negative than 9-12 year-old children. The group effect was not significant, $F(2, 90) = 1.22$, $p > .25$, (i.e., ratings were similar regardless of the type of faces scale used), as was the group X age interaction, $F(4, 90) = .75$, $p > .50$.

No Pain/Positive Emotions

For vignettes with the positive emotions and the absence of pain (e.g., getting lots of birthday presents), the ANOVA for faces scale scores revealed that the main effects for group, $F(2, 89) = .84$, $p > .25$, and age, $F(2, 89) = .30$, $p > .50$, were not significant. The group X age interaction, $F(4, 89) = .94$, $p > .25$, was also not significant. Thus, there were no differences in children's ratings for these vignettes as a function of either faces scale group or age group.

Similarly, the ANOVA on VAS scores showed that the main effects for group, $F(2, 82) = 1.55$, $p > .10$, and age, $F(2, 82) = 2.15$, $p > .10$, were not significant, nor was the group X age interaction, $F(4, 82) = 2.53$, $p > .05$. Again, all children had similar VAS ratings.

The ANOVA on emotions scores showed a significant main effect of age, $F(2, 89) = 5.50$, $p < .01$, with 5-6 year-old and 7-8 year-old children having significantly lower emotions scores than 9-12 year-old children. In other words, younger children tended to perceive these vignettes as more positive than the older children. The group effect was not significant, $F(2, 89) = 3.46$, $p > .01$, (i.e., ratings were similar regardless of faces scale group), as was the group X age interaction, $F(4, 89) = .22$, $p > .50$.

Pain/Positive Emotions

For vignettes with the presence of pain in a positive context (e.g., spraining an ankle but winning a race), the ANOVA showed a significant main effect of group, $F(2, 91) = 20.06$, $p < .001$. Children who used the smiling faces scales (i.e., children in Groups 2 (SS) and 3 (SA)) rated these vignettes as significantly less painful than children who used the neutral faces scale

(i.e., children in Group 1 (NS)). There was also a significant main effect of age, $F(2, 91) = 8.04$, $p<.01$, with 5-6 year-old and 7-8 year-old children rating these vignettes as significantly more painful than 9-12 year-old children. The group X age interaction was not significant, $F(4, 91) = 2.26$, $p>.05$.

Similarly, the ANOVA on VAS scores revealed that there was a significant main effect for group, $F(2, 74) = 5.01$, $p<.01$, with children in both Groups 2 (SS) and 3 (SA) having significantly lower VAS scores than children in Group 1 (NS). The effect of age was not significant (i.e., ratings were similar regardless of age), $F(2, 74) = 1.08$, $p>.25$, as was the group X age interaction, $F(4, 74) = 1.02$, $p>.25$.

The ANOVA on emotions scores showed a significant main effect of group, $F(2, 90) = 7.35$, $p<.01$, with children in Group 1 (NS) rating these vignettes as more negative than children in Groups 2 (SS) and 3 (SA). The age effect was not significant, $F(2, 90) = 2.21$, $p>.10$, as was the group X age interaction, $F(4, 90) = 1.66$, $p>.10$.

Discussion

This study examined whether use of faces scales with non-nociceptive affective representations, and accompanying instructions, would bias reports of pain generated by children responding to a series of hypothetical vignettes, and whether this biasing impact would be most pronounced among younger children. As predicted, there was a decided impact on the children's pain ratings produced by providing an affectively laden anchor at the low end of the scale that was influenced by the context in which ratings of pain were provided. The major biases observed were as follows: 1) for situations that involved negative emotions but no pain (e.g., waking up in a thunder and lightning storm), the use of a scale with a smiling face as the 'no pain' anchor produced ratings suggestive of pain even though there was none present; 2) for situations that

involved pain in the context of positive emotions (e.g., spraining an ankle but winning a race) the smiling scale shifted children's ratings toward the smiling 'no pain' face anchor, resulting in lower pain ratings in comparison to the ratings of children using the scale with the neutral face as the 'no pain' anchor. The presence of the smiling face thus biased children's ratings toward reporting less pain for this vignette type; 3) for vignettes with pain and negative emotions (e.g., getting a needle), the effect was more complex and depended on the age of the child responding. Children older than 7 years who used the smiling scale rated more pain for these vignettes (i.e., their ratings were shifted away from the smiling 'no pain' face anchor) as compared to the ratings of children using the scale with the neutral face as the 'no pain' anchor. There were no differences in pain ratings of children who were 5-6 years old. This is in contrast to what was hypothesized, as it was expected that the ratings of older children, who have the capacity for complex cognitive processing, would be less affected by the biasing impact of the scale with the smiling face as the 'no pain' anchor than the younger children's ratings. However, the lack of significant group differences among these younger children is likely due to a ceiling effect; all of these children, regardless of group, perceived this type of vignette as very painful (i.e., 3.4 or greater on a 0 to 4 scale).

There were no group differences in children's faces scale ratings of no pain/positive emotions vignettes (e.g., getting lots of birthday presents). Indeed, there was very little variability in children's ratings for this vignette type, showing that children in all groups correctly recognized that there was no pain present in these vignettes. Although no differences were found for this vignette type, this is the least likely clinical situation in which a child would be asked to report on pain.

In short, these data show that in situations that involve negative emotions or pain, the

type of faces scale used (i.e., smiling versus neutral face 'no pain' anchors) does influence children's self-reported ratings of pain. Specifically, the use of a scale with a smiling face as the 'no pain' anchor in situations that involve negative emotions (e.g., anxiety) but not pain, may result in "false positives" for pain, and in situations with both negative emotions and pain, may result in overestimations of the severity of the pain. Similarly, the use of the scale with the smiling face as the 'no pain' anchor in situations that involve positive emotions and pain may results in "false negatives" or underestimations of children's pain. These findings were evident even among children in the older age group (i.e., 9-12 years). This suggests that the valid self-reporting of pain is a difficult developmental task even for more cognitively advanced children, and that adult assessors of pain should give consideration to developmental perspectives when eliciting self-reports of pain from children.

Contrary to beliefs expressed in the literature, using affective language in the instructions accompanying the faces scales (e.g., making reference to the 'no pain' face as being "happy" because it is not in pain) did not bias children's pain ratings in one direction or the other. This was consistent with previous research by Nix and colleagues (1993) who showed no significant differences in children's responses using the Wong and Baker (1988) scale following an injection when the children were provided with either sensory or affective instructions. This stresses that it is the format of the scale, and not the accompanying instructions, that should be considered when choosing self-report measures to use with children.

As expected, there were age differences in reported pain by children using both the faces scales and the VAS. Younger children tended to perceive vignettes with negative emotions to be more painful than older children. This was consistent with previous research examining age-related differences in children's reports of pain intensities (Fradet et al., 1990; Goodenough et al.,

1997; Lander & Fowler-Kerry, 1991). Younger children also tended to perceive vignettes with positive emotions and the absence of pain as less negative than older children. However, it should be noted that age groups in the study were chosen as an approximation for developmental level, and that within any age group there would be considerable variability with respect to cognitive ability. In addition, it is not clear whether the results represented true age differences in children's perceptions of painful events, or rather a more general propensity for young children to report pain at the extremes of scales, which would also result in higher pain ratings among children in the younger group as compared to the older children.

Interestingly, there were also group differences in children's responses to vignettes when using the VAS and emotions measure related to the use of a particular faces scale. Those using a scale with a smiling face as the 'no pain' anchor tended to be biased in their ratings using the VAS and emotions measure as well. As children were randomly assigned to groups, it is not likely that the differences resulted from pre-existing biases in how children viewed pain and emotions. Rather, it seems probable that the children's ratings on one scale were affected by their ratings on another, and that rating pain using a smiling faces scale altered children's concept of pain and emotions, subsequently altering their ratings using the VAS and emotions measures.

These findings bear upon our understanding of children's pain experiences and have clinical implications for those who work with children in pain. A smiling faces scale will shift children's ratings and may not provide the most valid self-report of pain as compared to scales with a neutral face as the 'no pain' anchor. It is imperative for clinicians to be clear as to the construct they wish to measure. Being accurately able to discriminate between negative emotions (e.g., anxiety vs. pain) has a number of important diagnostic and treatment implications in caring for children's health. For example, a hospitalized child who is recovering from surgery may

complain that s/he has a "hurt". Depending on how the child's "hurt" is interpreted, s/he may be treated differently. A clinician who believes the child is reporting *pain* may fear that the child is suffering complications from surgery or may try to distract the child from the pain. However, a clinician who interprets the report to be one of *anxiety* or *fear* might try to address the child's concerns in order to comfort him/her rather than distract the child. Failure to distinguish between pain and anxiety may result in children receiving inappropriate medications for their current state (i.e., analgesics are used to manage pain whereas anxiolytics are used to manage anxiety) or may decrease the likelihood that a child will receive medication should his/her distress be interpreted as anxiety rather than pain.

However, it is difficult to isolate a child's pain experience from other emotional states. Indeed, even children in this study who used the scale with a neutral face as the 'no pain' anchor accompanied by sensory instructions appeared to be confused between pain and negative emotions and sometimes rated pain as present in no pain/negative emotions vignettes. Clearly, providing a valid self-report of pain may be challenging for children even under the best of circumstances. One suggestion has been to assess and monitor children's pain and anxiety separately, using two separate scales (Goodenough et al., 1997; Kuttner & LePage, 1983). It may be that first asking children about their anxiety, and then their pain, results in more accurate reports from children.

There were limitations to this study. First, the children rated pain in hypothetical vignettes. Although vignettes have been shown to be useful paradigms for learning about children's pain experiences (e.g., Belter et al., 1988), and the vignettes in this study showed good reliability, the degree to which these results would generalize to actual clinical pain situations is not known. A future study should administer several of the already existing faces pain scales in a

random order to a clinical sample of children undergoing a painful procedure (e.g., venepuncture), to examine whether the biasing impact of the smiling anchor evidenced in this study would also be present in the context of clinical pain. Secondly, the faces scales used were developed for specific use in this study. Although these faces scales demonstrated very good reliability (i.e., rank ordering) and validity (i.e., correlations with the VAS), their psychometric properties are not as well explored as other more established measures which are typically used in assessing children's pain (Champion, Goodenough, von Baeyer, & Thomas, 1998).

There are various other properties of faces scales which should be investigated empirically, including the influence of tears and the number of faces included in the scale on children's pain ratings. In general, future research should aim not at developing new faces scales and other self-report measures for children, but rather at furthering our understanding of the reliability and validity of currently available measures.

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Table 1

Mean Faces Scale, VAS, and Emotions Scores as a Function of Group for the Four Different Types of Vignettes

	Group		
Measure	Neutral/Sensory	Smiling/Sensory	Smiling/Affective
	No Pain/Negative Emotions		
Faces scale			
M	1.40[a]	3.42[b]	3.47[b]
SD	1.19	0.69	0.65
n	34	32	34
VAS			
M	37.97[a]	59.48[b]	63.15[b]
SD	19.86	18.41	16.84
n	31	31	30
Emotions			
M	2.66[a]	2.67[a]	2.67[a]
SD	0.30	0.27	0.38
n	34	32	34
	Pain/Negative Emotions		
Faces scale			
M	2.57[a]	3.74[b]	3.66[b]
SD	0.79	0.42	0.39
n	34	32	34
VAS			
M	65.74[a]	81.07[b]	79.05[b]

table continues . . .

SD	10.42	10.35	10.74
n	28	27	27
Emotions			
M	2.67[a]	2.81[a]	2.74[a]
SD	0.30	0.27	0.29
n	34	32	33
	No Pain/Positive Emotions		
Faces scale			
M	0.03[a]	0.00[a]	0.05[a]
SD	0.13	0.00	0.19
n	33	32	33
VAS			
M	3.52[a]	4.62[a]	3.72[a]
SD	3.29	5.28	2.68
n	30	31	30
Emotions			
M	0.28[a]	0.29[a]	0.20[a]
SD	0.17	0.21	0.16
n	32	32	34
	Pain/Positive Emotions		
Faces scale			
M	2.30[a]	1.00[b]	1.38[b]
SD	0.99	0.77	1.16
n	34	32	34
VAS			
M	48.76[a]	34.11[b]	35.02[b]

table continues . . .

SD	19.68	19.80	20.89
n	26	27	30
Emotions			
M	1.52[a]	1.01[b]	1.06[b]
SD	0.65	0.55	0.63
n	33	32	34

Note. Means in the same row with different superscripts differ at $p<.01$ or better. Faces scale scores range from 0 to 4 (higher scores reflect higher levels of pain), VAS scores range from 0 to 100 (higher scores reflect higher levels of pain), and emotions scores range from 0 to 3 (higher scores reflect higher levels of negative emotions. Samples sizes vary due to missing data.

Table 2

Mean Faces Scale, VAS, and Emotions Scores as a Function of Age for the Four Different Types of Vignettes

	Age		
Measure	5-6 years	7-8 years	9-12 years
	No Pain/Negative Emotions		
Faces scale			
M	3.24[a]	2.49[b]	2.56[b]
SD	0.94	1.42	1.41
n	32	34	34
VAS			
M	61.28[a]	55.01[a]	45.18[b]
SD	20.19	18.57	22.75
n	27	33	32
Emotions			
M	2.76[a]	2.68[a]	2.56[a]
SD	0.32	0.30	0.31
n	32	34	34
	Pain/Negative Emotions		
Faces scale			
M	3.57[a]	3.33[a]	3.05[b]
SD	0.55	0.83	0.84
n	32	34	34
VAS			
M	77.85[a]	76.91[a]	70.56[a]

table continues . . .

SD	12.52	12.36	10.68
n	24	32	26
Emotions			
M	2.80[a]	2.85[a]	2.58[b]
SD	0.25	0.20	0.33
n	31	34	34
	No Pain/Positive Emotions		
Faces scale			
M	0.04[a]	0.01[a]	0.03[a]
SD	0.18	0.06	0.13
n	32	34	32
VAS			
M	3.76[a]	3.33[a]	4.78[a]
SD	2.85	1.99	5.72
n	26	33	32
Emotions			
M	0.23[a]	0.20[a]	0.33[b]
SD	0.20	0.13	0.20
n	32	33	33
	Pain/Positive Emotions		
Faces scale			
M	1.79[a]	1.80[a]	1.14[a]
SD	1.36	0.83	1.03
n	32	34	34
VAS			
M	38.51[a]	43.00[a]	35.60[a]

table continues . . .

SD	27.39	17.38	18.19
n	27	29	30
Emotions			
M	1.14[a]	1.37[a]	1.08[a]
SD	0.77	0.68	0.47
n	31	34	34

Note. Means in the same row with different superscripts differ at $p<.01$ or better. Faces scale scores range from 0 to 4 (higher scores reflect higher levels of pain), VAS scores range from 0 to 100 (higher scores reflect higher levels of pain), and emotions scores range from 0 to 3 (higher scores reflect higher levels of negative emotions. Samples sizes vary due to missing data

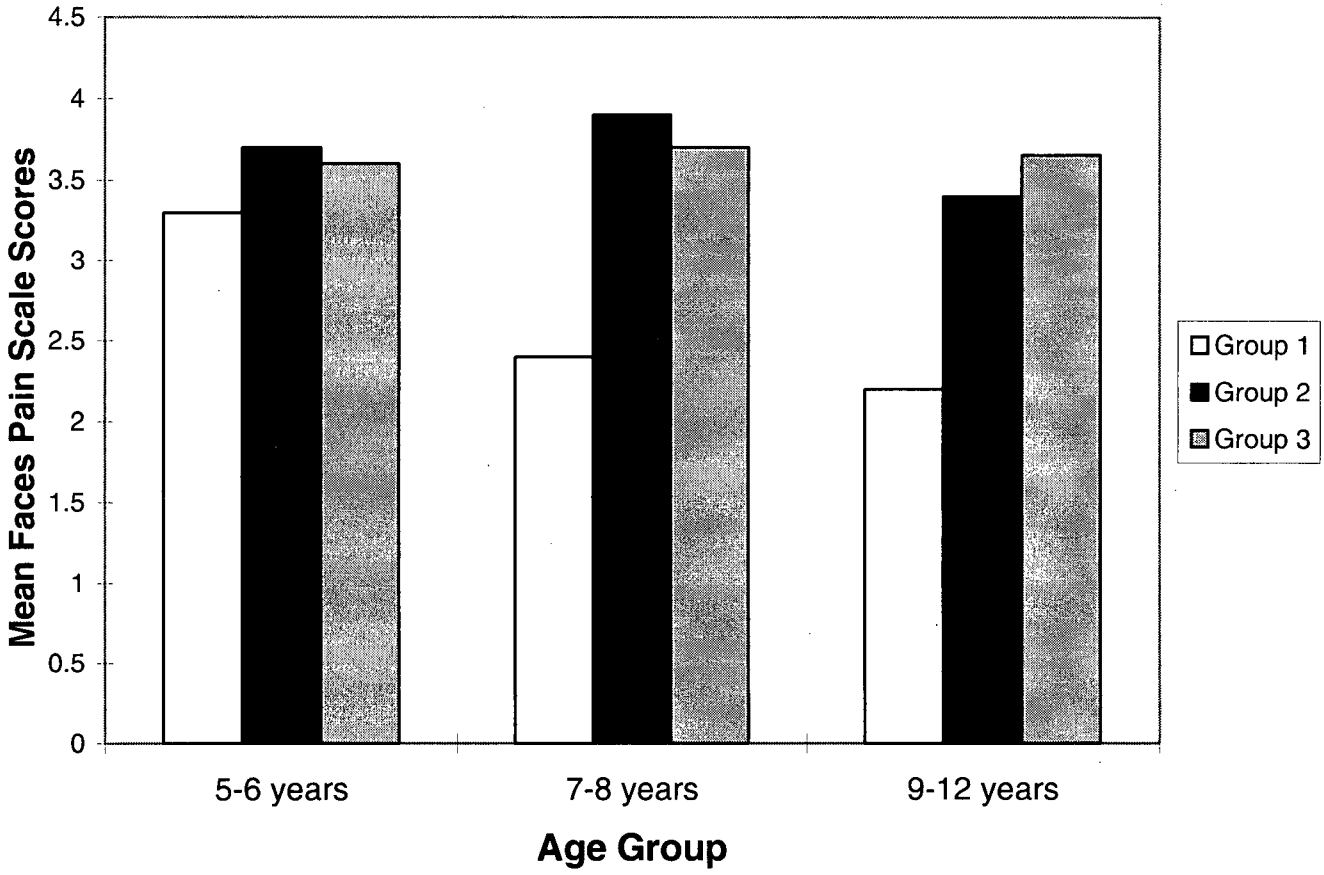


Figure 1: Mean faces pain scale scores for pain/negative emotions vignettes as a function of group (NS vs. SS vs. SA) and age (5-6 vs. 7-8 vs. 9-12 years). Asterisk indicates $p < .01$ significant difference in simple main effect. NS (Group 1) = neutral scale and sensory instructions; SS (Group 2) = smiling scale and sensory instructions; SS (Groups 3) = smiling scale and affective instructions. Faces pain scale scores range from 0 to 4 (higher scores reflect higher pain ratings).

Appendix A

Parent Consent Letter

Department of Psychology
2136 West Mall
Vancouver, B.C. Canada V6T 1Z4
Tel: (604) 822-2755
Fax: (604) 822-6923

Parent Consent Letter
A Comparison of Faces Pain Scales for the Assessment of Children's Pain

Dear Parent/Guardian,

As you are no doubt aware, in the course of children's everyday play and activities, being hurt is relatively common. Fortunately, these are usually minor scrapes and bruises that heal rapidly. Dr. Kenneth Craig and Ms. Christine Chambers, from the Department of Psychology at the University of British Columbia, are interested in having your child report on these everyday events in the interests of helping us develop better measures of pain that will assist in the care of children suffering more serious conditions. A detailed description of the study procedures is outlined below. After reading this letter, we would like you to please indicate whether or not you give permission for your child to take part in our study and return the form to your child's day care by **WEDNESDAY, JULY 23, 1997**. Your child will receive a pencil simply for returning this form, regardless of whether you allow him/her to take part in the study or not.

Study Procedures:

We will interview children and show them a series of 12 cartoon vignettes that depict situations children typically experience (e.g., falling off a bike). For each of the cartoon vignettes, we will ask children to rate the level of pain and emotions they think the child in the vignette would feel in response to the situation. Children will be asked to rate in two ways: first, by putting a mark on a line from "no pain" to "worst possible pain", and then by circling a face from among a series of faces showing different levels of pain. Children will be chosen at random to rate pain using one of two possible faces pain scales. The only difference between the two faces pain scales will be the expression on the faces. The interview should take around 10 minutes per child. All that would be involved is answering questions - no child will actually experience any painful procedure.

Confidentiality:

Any information resulting from this research study will be kept strictly confidential. All documents will be identified only by code numbers and kept in a locked filing cabinet. Children will not be identified by name in any reports of the completed study. Computer data records will be kept on floppy disks and stored in a locked filing cabinet. No risks are anticipated with taking part in this study.

Appendix B

Child Assent Form

Department of Psychology
2136 West Mall
Vancouver, B.C. Canada V6T 1Z4
Tel: (604) 822-2755
Fax: (604) 822-6923

Child Assent Form

A Comparison of Faces Pain Scales for the Assessment of Children's Pain

Dr. Craig and Ms. Christine Chambers are doing a project about feelings and pain people like you have in different situations. We will show you 12 different cartoons of children in different situations (e.g., falling off a bike) and then ask you to rate how much pain you think the child in the cartoon would feel and how much of some other feelings (e.g., happy, sad) you think the child in the cartoon would have. This should take about 15 minutes.

There are no right or wrong answers to any of the questions we will be asking you. Nobody but us will see your answers. Your name will not be on any of the questionnaires and we will keep all your answers in a locked cabinet.

Most children enjoy answering these questions for us, but if you want to stop at any time just let us know, or if you do not want to do this, just tell us and we won't do this. Remember, your answers will help us learn about what people your age think about the pain and feelings that children would feel in these different situations, so be as honest as you can.

If you agree to take part, please write your name on the line below.

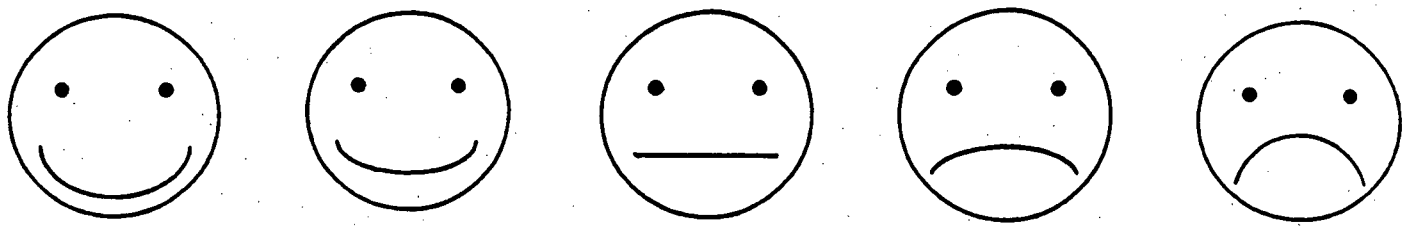
Name: _____

Date: _____

_____
Witness Signature

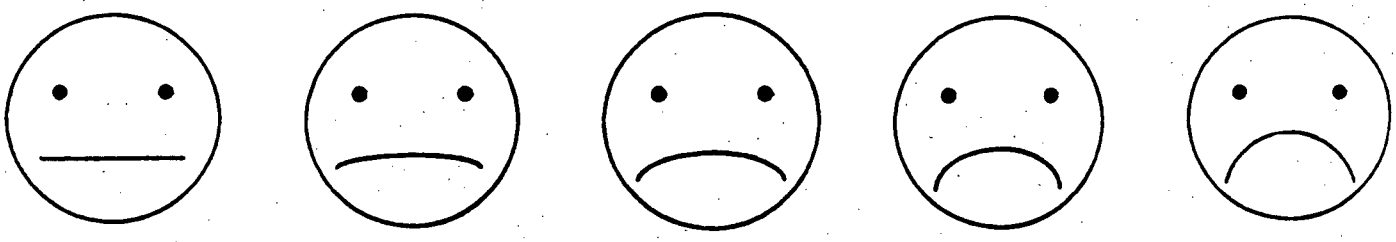
Appendix C

Faces Scales



NO PAIN

WORST PAIN POSSIBLE

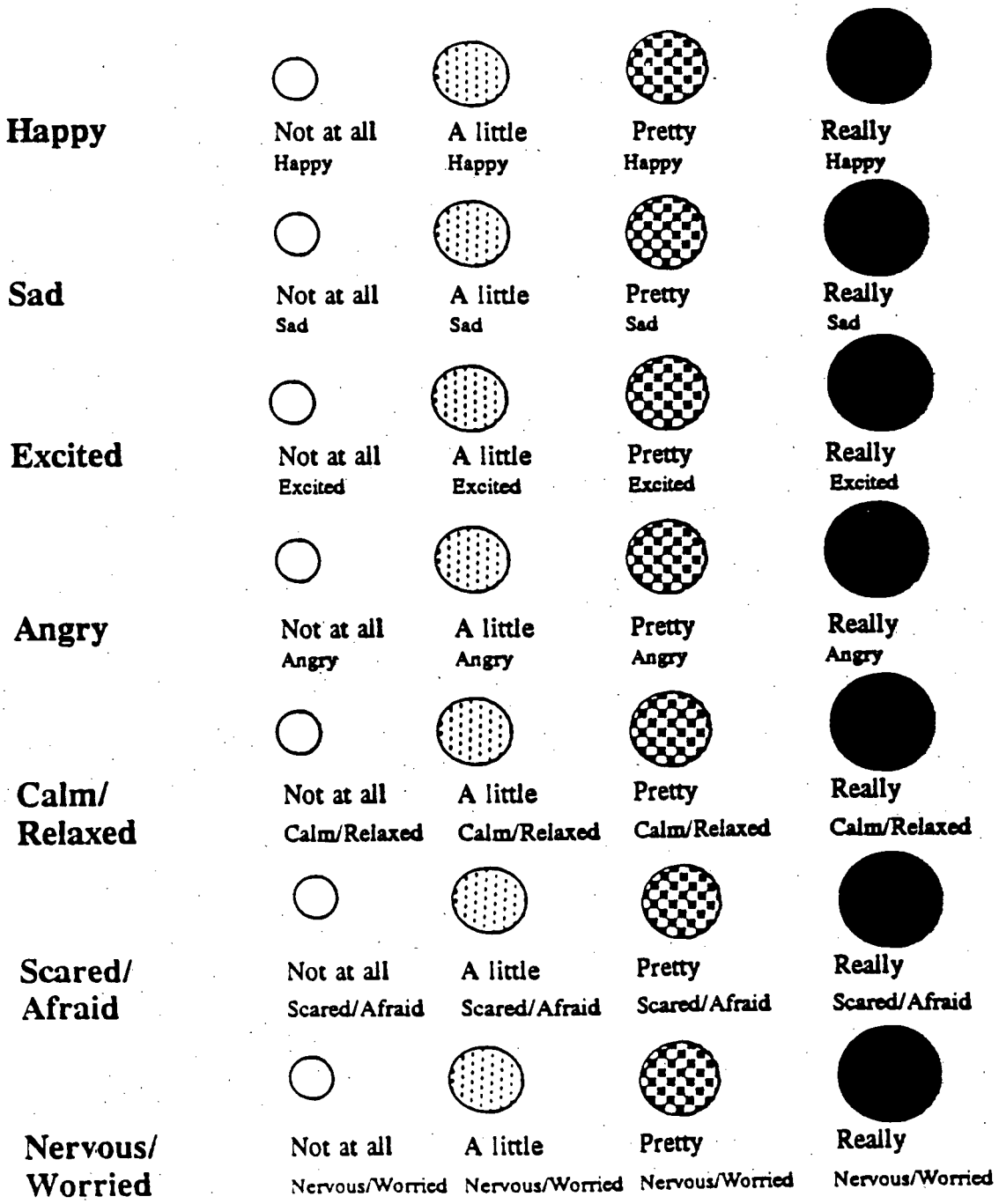


NO PAIN

WORST PAIN POSSIBLE

Appendix D

Emotions Rating Scale


Happy
Not at all Happy
A little Happy
Pretty Happy
Really Happy
Sad
Not at all Sad
A little Sad
Pretty Sad
Really Sad
Excited
Not at all Excited
A little Excited
Pretty Excited
Really Excited
Angry
Not at all Angry
A little Angry
Pretty Angry
Really Angry
Calm/ Relaxed
Not at all Calm/Relaxed
A little Calm/Relaxed
Pretty Calm/Relaxed
Really Calm/Relaxed
Scared/ Afraid
Not at all Scared/Afraid
A little Scared/Afraid
Pretty Scared/Afraid
Really Scared/Afraid
Nervous/ Worried
Not at all Nervous/Worried
A little Nervous/Worried
Pretty Nervous/Worried
Really Nervous/Worried

Appendix E

Visual Analogue Scale (VAS)

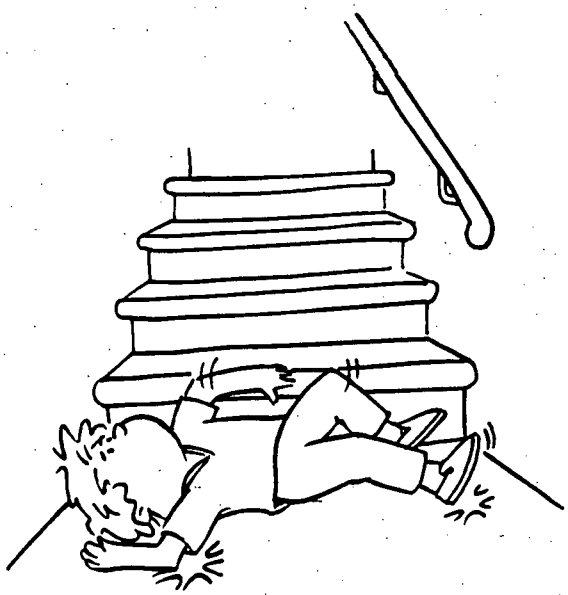
NO PAIN _____ WORST PAIN POSSIBLE

Appendix F

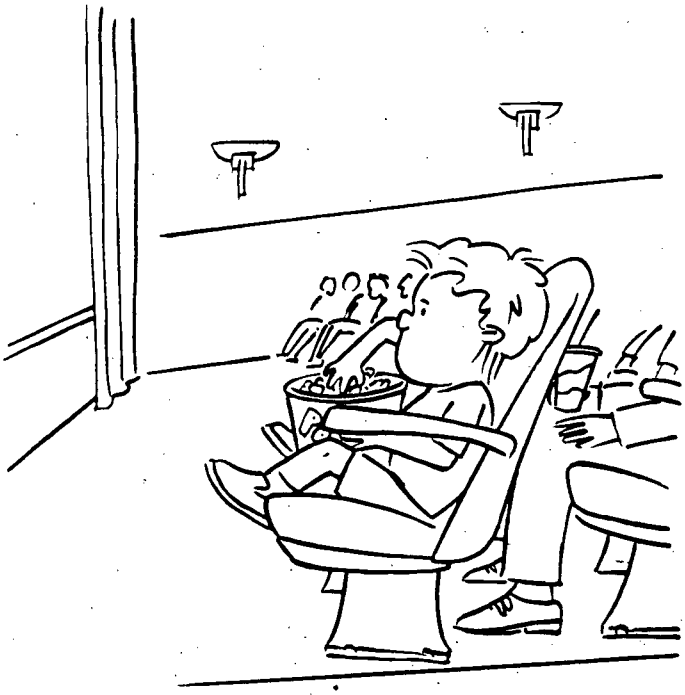
Children's Pain Vignettes

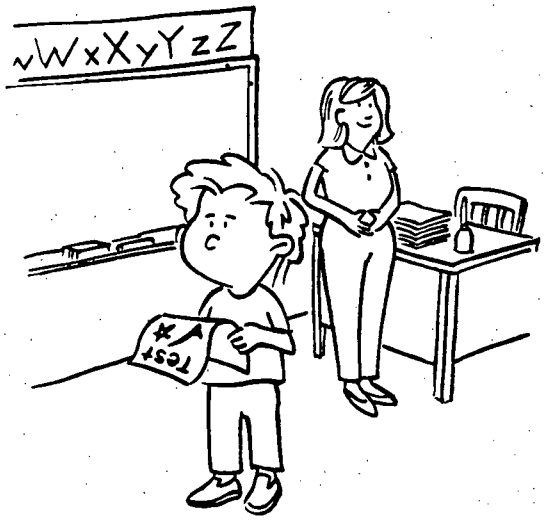
Pain/Positive Emotions

Pain/Negative Emotions



No Pain/Positive Emotions





No Pain/Negative Emotions