ORIGINAL ARTICLE

Anxiety influences children's memory for procedural pain

Elizabete M Rocha PhD[1], Tammy A Marche PhD[2], Carl L von Baeyer PhD[2]

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OBJECTIVE: To examine the effects of temperament and trait anxiety on memory for pain.
METHODS: Three dimensions of temperament, as well as trait anxiety, were assessed in 36 children (five to 12 years of age) undergoing dental procedures; after the procedure, the children provided pain ratings. Following a six- to eight-week delay, the children reported how much pain they remembered.
RESULTS: Most children (85%) accurately recalled their pain. Temperament had no significant effect, but trait-anxious children showed a greater likelihood of recalling more pain than they initially reported, suggesting that they may negatively distort recollections of painful experiences.
CONCLUSIONS: When treating children, in particular trait-anxious children, clinicians should consider what children remember as part of pain management intervention.

Key Words: *Anxiety, Children; Memory; Procedural pain; Temperament*

L'anxiété influe sur la mémoire de la douleur liée aux interventions chez les enfants

OBJECTIF : Examiner les effets du tempérament et de l'anxiété réactionnelle sur la mémoire de la douleur.
MÉTHODE : Nous avons évalué trois dimensions du tempérament et l'anxiété réactionnelle chez 36 enfants (âgés de 5 à 12 ans) devant subir une intervention dentaire. Après l'intervention, les enfants ont donné une évaluation de leur douleur. Après un intervalle de six à huit semaines, les enfants ont indiqué le degré de douleur dont ils se rappelaient.
RÉSULTATS : La plupart des enfants (85 %) avaient un souvenir exact de leur douleur, le tempérament n'a eu aucun effet significatif, mais les enfants présentant une anxiété réactionnelle étaient plus susceptibles de se rappeler une douleur plus intense qu'ils ne l'avaient signalée initialement, ce qui donne à penser que leur mémoire des expériences douloureuses subit l'effet d'une distorsion négative.
CONCLUSION : Lorsqu'ils traitent des enfants, en particulier des enfants présentant une anxiété réactionnelle, les cliniciens doivent tenir compte du souvenir que les enfants gardent d'une intervention douloureuse.

Children differ radically from one another in how they react to distressful or painful procedures (1). Although researchers recognize that increasing our knowledge of memory for painful events is important for understanding health behaviour, as well as for pain assessment and treatment (2-5), there is little systematic work on what children remember about pain and pain-related experiences, or what factors influence these recollections (2,6,7).

There is increasing evidence to suggest that what we recollect about painful experiences is more important in predicting future clinical behaviour than the actual pain experienced. For example, it is known that remembered pain intensity from a painful experience is the best predictor of how much pain one reports when re-exposed to the same procedure (8). Consistent with this finding, memories of medical experiences have been shown to affect later fear and pain levels and the tendency to avoid medical situations (9). Studies with children have found that the memory of a previous painful medical procedure may diminish the effect of pain-reducing medications provided during subsequent procedures (10) and that the memory of a previous painful dental procedure predicts pain reports for a subsequent dental procedure (11). Such findings demonstrate that the memory of previous pain is a key factor in one's response to future pain.

Currently, there is growing interest in the idea that individual differences may account for the variability seen in children's recollections of painful procedures (2). The range of individual differences examined in relation to children's recall of pain is limited (12,13). The focus of the present article is on two particular individual differences – trait anxiety and temperament – and how they may affect the recollection of pain. Both trait anxiety and temperament reflect long-term, relatively stable styles of reacting to the environment (14,15). Such styles may influence the meaning that individuals attach to a painful stimulus (16) and, thus, the recollection of the pain. That is, general anxiety and temperament levels provide an experiential context through which the painful stimulus is processed and later recalled. For example, temperament and anxiety may influence the focus of one's attention during a pain event and one's interpretation of that pain, thus influencing recall.

The goal of the current study was to examine how trait anxiety (a general proneness to anxious behaviour rooted in personality) and temperament (a child's behavioural style) influence children's memory of procedural pain. Our specific objectives were to examine how well children recall pain over time, as well as the roles that anxiety and temperament play in children's memory and negative distortions of pain. A review of the available literature examining how well children recall pain over time is provided, followed by an overview of the roles that anxiety and temperament may play in children's memory for pain.

Given clinicians' reliance on recall of pain in evaluating the efficacy of treatment (3), researchers have been interested in determining whether such reliance is justified. We know that children are generally accurate in their recall of pain intensity when assessed one week after the incident, with older children showing more accurate recall than younger children (7). Children have also been found to accurately recall affective pain from venipuncture (accurate within one face on a faces

[1]*Department of Psychology, University of Northern British Columbia, Prince George, British Columbia;* [2]*University of Saskatchewan, Saskatoon, Saskatchewan*
Correspondence: Dr Tammy A Marche, St Thomas More College, University of Saskatchewan, 1437 College Drive, Saskatoon, Saskatchewan S7N 0W6. Telephone 306-966-8076, fax 306-966-8904, e-mail tmarche@stmcollege.ca

scale) two months later (13), pain intensity in a cold pressor test one year later (6), and discomfort in dental settings six weeks and three months later (12). However, Cohen et al (2) found that children in a typical care group who underwent injections actually recalled more pain six months later than they reported following the procedure. Cohen et al cautioned that their sample is only generalizable to low-income ethnic minority children. They also noted that their results are based on average scores and that, in examining children's recall of distress, there were significant individual differences across children. These researchers recommended that examination of psychosocial correlates of memory for pain may illuminate some of their results.

It is, therefore, necessary to examine individual difference (eg, anxiety and temperament) correlates of children's memory accuracy because such findings may account for the variability seen in children's recall of pain (2). Such findings may also help identify children at risk for negatively distorted memories – that is, those children who later recall more pain than they reported at the time of the actual experience.

The literature on children's anxiety suggests that state anxiety (transitory emotional state) is not related to delayed pain recall from venipuncture (13) or discomfort recalled from a dental treatment (11). In adults, negative affect (8) and high trait anxiety (17) have been associated with negatively distorted memories of pain. In the one study (7) that examined trait anxiety in children, daily pain diaries of hospitalized patients showed that anxiety was not related to the accuracy of pain recall. However, Zonneveld et al (7) noted that because their measure of trait anxiety was completed while the children were in the hospital, it more likely assessed state, rather than trait, anxiety. Therefore, the question of whether trait anxiety influences recollection of pain in children has not been adequately tested. Given our focus on long-term, relatively stable styles of reacting to the environment and given that previous studies with children found no relation between state anxiety and memory for pain, the current study included an examination of trait anxiety only. Excluding state anxiety had the added benefit of avoiding any potential concerns regarding questioning children about their level of anxiety before or during painful procedures.

A child's behavioural style (temperament), especially a behavioural style high in emotionality (ie, child gets upset or cries easily), may influence the degree of attention devoted to painful stimuli and, therefore, a child's memory for pain. Although there is scant research available, existing evidence supports the suggestion of linkages among temperament and anticipatory distress regarding immunizations (18) and temperament and memory for pain (19). Temperament is believed to influence sensitivity and reactivity to stressful situations (20-22) and, more specifically, painful situations (23). The only study to date to examine temperament and pain recall (19) was completed by researchers in dentistry who determined that children with higher negative emotionality scores experienced less amnesia during a dental procedure for which they were sedated. Thus, the emotionality dimension of temperament may be related to a poorer ability to forget some aspects of pain-related experiences. Given the lack of research linking other aspects of temperament (eg, shyness, sociability and activity) to memory for pain, only hypotheses involving emotionality are put forth.

The present study had three hypotheses. Based on the bulk of previous research demonstrating accurate recall for pain (6), it was predicted that, overall, children will accurately recall (within 20%) the pain they experienced on the day of their dental visit. It was expected that children who reported higher levels of trait anxiety, and whose parents describe them as having temperaments high in emotionality (eg, gets upset or cries easily), would report higher levels of pain experienced during dental procedures when compared with children with lower levels of trait anxiety and emotionality. Children with higher levels of emotionality who were more trait anxious were expected to recall more pain than they initially reported experiencing (ie, negatively distort their pain recollections) to a greater extent than those children with lower levels of emotionality and anxiety. Dental visits are commonly experienced by children and yet little research has focused on pain and recall from these procedures (11).

METHOD

Participants and setting

Thirty-six parents (78% mothers) and their children participated. Mean (± SD) child age was 8.12±2.21 years (range five to 12 years); 58% were boys. The families' occupational status was generally middle class (mean socioeconomic index = 42.41±11.79) according to the scale developed by Blishen et al (24). Children experienced a range of dental procedures (eg, cleanings, check-ups, diagnostic examinations, fillings and extractions). Children were selected, as a convenience sample, from six dental practices serving families from both urban and rural settings.

Measures

Pain levels: The Faces Pain Scale – Revised (FPS-R) (25) is a self-report measure of pain intensity for children four to five years of age and older that has shown excellent interscale agreement (25). FPS-R scores range from 0 to 10.

Anxiety: The trait anxiety portion of the Spielberger State-Trait Anxiety Inventory for Children (15) was used. The scale consists of 20 weighted items with three response options available; scores range from 20 to 60. The scale has adequate psychometric properties (14). Examples of items include "I am secretly afraid" and "I worry too much".

Temperament: The Emotionality Activity Sociability Temperament Survey for Children (14) was used to assess three dimensions of temperament – emotionality, activity and sociability (which includes the subdimension shyness). The survey has adequate psychometric properties (13) and has been used with young school-aged children (26,27). The temperament dimensions were computed by determining the average score from the four items on each scale. Parents rated each item on a five-point scale from 1 = "not characteristic or typical for your child" to 5 = "very characteristic or typical for your child". Examples of emotionality scale items include "child cries easily" and "child reacts intensely when upset".

Procedure

With approval of the institutional Research Ethics Board, parents of children arriving for dental appointments were asked if they would participate in a study of children's responses to dental visits. Ninety-five per cent of families

TABLE 1
Summary data for study variables

Variable	Mean	SD	Range
1. Pain report, time 1	2.44	2.76	0–10
2. Pain report, time 2	1.67	2.32	0–8
3. Trait anxiety	35.28	8.86	21–60
4. Emotionality	12.86	4.13	5–22
5. Shyness	12.14	3.76	5–21
6. Sociability	17.72	3.30	9–25
7. Activity	19.17	3.87	12–25

Time 1 = immediately following procedure; Time 2 = six- to eight-week delay

TABLE 2
Correlation matrix for pain scores and individual difference factors (n=36)

	1	2	3	4	5	6	7
1. Pain report, time 1	–	0.49*	0.23	0.11	–0.11	–0.02	0.14
2. Pain report, time 2		–	0.48*	–0.16	–0.15	–0.08	–0.12
3. Anxiety			–	0.16	0.08	–0.23	0.00
4. Emotionality				–	0.50*	0.13	0.14
5. Shyness					–	–0.30	–0.26
6. Sociability						–	0.30
7. Activity							–

Time 1 = immediately following procedure; Time 2 = six- to eight-week delay.
**P<0.01*

approached agreed to participate. Children receiving medications other than local anesthetics were excluded. Informed parental consent and child assent were obtained. Parents either accompanied the child or remained in the waiting room, according to the typical procedure at the practice. No differences were found in pain reports according to whether parents accompanied their child. Parents completed a questionnaire packet that included demographic information and the Emotionality Activity Sociability Temperament Survey for Children (14) while their child was undergoing the dental procedure. Following the procedure, children rated the level of pain they experienced; parents were not present during the pain rating. Children were given a package of sugarless gum for participating in the study and their names were put into a draw for a $100 prize.

To avoid confounding state and trait anxiety, children were telephoned the same day of the procedure to complete the trait anxiety measure over the phone. After a six- to eight-week delay (mean delay 50.88±6.83 days; range 40 to 71 days), children were telephoned and again asked to recall the level of pain they experienced. To ease administration of the FPS-R (25) via telephone, families were provided (via mail) with a scale of numbers printed approximately 5 cm below each corresponding face. The child was given the same instructions as for an in-person administration, except that after s/he was asked to point to the face, s/he was asked to tell the researcher the number that was printed below that face. Children appeared to have no difficulty with this instruction and similar methodology was successfully used by Badali et al (6).

RESULTS

Table 1 shows the summary data for the variables. Mean trait anxiety scores and temperament scores are comparable with those of normative samples and previous research (14,28,29). No differences in the study variables (ie, pain, memory, anxiety and temperament) as a function of type of procedure, dental practice visited or child age were found; therefore, analyses were collapsed across these groups. The first hypothesis proffered was that, on average, children would accurately recall the pain they experienced on the day of their visit. The percentage of children after a six- to eight-week delay (time 2) who accurately recalled the amount of pain they reported immediately following the procedure (time 1) was calculated. As with previous research (6,7,13), recollections were considered accurate if they were within one face (2/10 pain score) of their original report. Eighty-five per cent of children correctly recalled their pain reports after a delay (time 2). The length of the delay was not found to be significantly related to accuracy of children's pain recall. The mean pain score provided by children after the procedure (2.44) indicates a mild amount of pain and is consistent with other studies of procedural pain in children (2,6).

The second prediction was that children who reported higher levels of trait anxiety, and whose parents described them as having temperaments high in emotionality, would report higher levels of pain experienced during dental procedures. To determine whether variation in trait anxiety and temperament was related to self reports of the degree of pain experienced during the dental procedure, correlations between pain at time 1 and anxiety and temperament were examined. Results showed that neither individual difference factor was related to pain reports at time 1 (Table 2).

The third hypothesis was that children with higher levels of emotionality, and children who were more trait anxious, would negatively distort their pain recollections when compared with children who had lower levels of emotionality and anxiety. Table 2 shows that anxiety was significantly related to children's pain reports at time 2. Thus, children higher in trait anxiety are more likely to recall more pain after a delay, suggesting that these children may be negatively distorting their memory of pain. To examine this hypothesis further, FPS-R scores at time 2 (recalled pain) were compared with children's original FPS-R scores at time 1. Next, recalled pain was classified into one of three groups – higher, lower or the same (exact) as the original pain report. One-way ANOVAs were then conducted with recalled pain as the independent factor (three levels – higher, lower or same). The dependent variables were emotionality and trait anxiety. There was no significant effect of emotionality on recalled pain; $F(2, 33)=0.85$, $P=0.44$. Trait anxiety had a marginally significant effect on recalled pain; $F(2, 33)=3.1$, $P=0.06$. Bonferroni post hoc tests showed that the 13% of children whose recalled pain was higher than their original pain report (ie, children who negatively distorted their memory of the pain) had significantly higher trait anxiety scores than children whose recalled pain was the same as their original pain reports (mean difference = –10.40; $P=0.05$). See Table 3 for trait anxiety scores across the three groups of recalled pain.

DISCUSSION

Children who reported higher levels of trait anxiety tended to remember more pain after a delay than children who reported lower levels of trait anxiety, which indicates that they may be negatively distorting their recollections of pain. These findings should be replicated with other procedures and age groups; if

TABLE 3
Trait anxiety scores across three groups of recalled pain

Recalled pain	Mean	SD	n
Lower at time 2 than time 1	35.3	7.1	11
Same at times 1 and 2	33.2	8.2	20
Higher at time 2 than time 1	43.6	11.6	5

Time 1 = immediately following procedure; Time 2 = six- to eight-week delay

this relation holds in future research, there are implications for clinical care. Children with higher trait anxiety may require special treatment interventions such as the distraction-type intervention used by Cohen et al (2). Research has found that positively reframed memories decrease children's distress during future medical procedures (30,31). Distress management interventions aimed at current procedural distress may have delayed benefits and positive influences on coping with future pain. Such interventions may be particularly important for chronic or recurrent illness requiring pain management. However, before such applications are considered, it will be necessary not just to confirm an association between anxiety, temperament and memory for pain, but also to obtain a better understanding of the mechanisms underlying the associations. For example, factors such as the meaning and interpretation of pain may play a role (16). Another possibility is that children with anxious dispositions may have more difficulty forgetting pain-related experiences, which may result in poorer coping for subsequent procedures because they may be focusing on the negative aspects of the procedure.

The prediction that the emotionality dimension of temperament is related to recollection of pain was not confirmed. Our mean temperament scores were comparable with those found in other studies using a sample with a similar age (28). Also, our temperament measure was the same one used by Jensen and Stjernqvist (19), who found a relationship between emotionality and memory. However, the participants in their study were younger (1.4 to 4.25 years), the pain scores were based on observer (parent) report (not self-report) and the procedures examined were highly stressful and required sedation. It may be that emotionality plays a role in children's reactions to highly stressful events. In the present study, the procedures ranged in stressfulness from cleanings to pulpotomy (a form of root canal), with approximately one-half of the children undergoing lower-stress procedures (ie, no local anesthetic given).

Results of the present study also indicated that children are fairly accurate and reliable in recalling their pain. These results are consistent with other studies employing well-validated pain intensity measures and using samples of children with ages similar to those in the present study (6,7). Together with other available research, the present study suggests that children are generally capable of providing accurate reports of painful procedures that they have experienced. Of course, further prospective work is needed to build on such findings and link the research in this area to current models of memory.

Limitations of our study should be mentioned. First, both anxiety and pain were measured via self-report; thus, it is possible that a reporting bias exists whereby some children are higher in general negativity (report more concerns and symptoms) than others. Use of observational measures of the child's pain would help to address this issue. Additionally, the tendency to report more symptoms overall may be an individual difference factor that plays a role in recollection of pain. The small sample size limited the number and type of analyses conducted. The small sample size limited the statistical power of the study as well as the number and type of analyses conducted. Replication of our findings with a larger, less variable sample (eg, only dental fillings and narrower age group) is needed. Additionally, examination of a six-month to one-year delay would increase clinical relevance of the findings.

The present study provides preliminary evidence of the effects of individual differences on children's recollections of clinical pain and contributes to the scant literature in this area. In the future, examination of other psychosocial correlates of accuracy and other distressful procedures may help identify children with the most negatively distorted memories and aid in the development of appropriate interventions to reduce the formation of such memories.

Based on the findings of the present study, together with previous research on children's memory for pain (5), some recommendations can be offered for clinical care. Given that negatively distorted pain memories may cause avoidance and neglect of some medical and dental procedures, consideration should be given to directly targeting memories as part of proper preparation and pain management intervention. Children who self-report high levels of trait anxiety behaviours (eg, feeling fearful, shy or worried) appear to be more likely to distort their memory of pain and would benefit from such interventions. This type of investment will help children have more positive memories of medical procedures, leading to improved health care attitudes and future health behaviour. It will also benefit clinicians via reduced time to complete procedures. It is important to recall that patterns for health care attitudes and behaviours are established in childhood and persist into adulthood (23,32).

There are evidence-based strategies that may be used with children to minimize negatively distorted memories and enhance future coping during painful procedures. Several studies on advance preparation for surgery show that preparation such as a hospital visit and educational video help to reduce children's preoperative anxiety (33). Cohen et al (2) found that children who were distracted with a movie during vaccination did not develop negative pain memories that occurred with typical care. Thus, an intervention that directed attention away from painful sensations also helped to reduce the development of negatively distorted pain memories. The research on reframing children's memories of painful events to focus on positive aspects and positive coping is promising. Chen et al (31) successfully reduced children's distress caused by a lumbar puncture (LP) by using an intervention designed to reframe memory of a previous LP. They examined biases in children's recall of threatening details, anxiety and pain, and then helped them reassess their reactions to their last LP. Children were helped to remember positive aspects such as moments when they did not cry and when they coped well. Children were encouraged to feel they had effective coping strategies to help them manage the procedure. Research has also shown that having parents simply give children accurate information that a procedure will hurt to some extent may reduce subsequent reports of how painful it was (34). Overall, it is important for clinicians and parents to discuss previous distressing

experiences with children and emphasize positive aspects of those experiences.

SUMMARY

When treating children, in particular trait-anxious children, clinicians should consider what the children will remember. A seemingly minor procedure may be remembered as distressful by a child. Clinicians can determine children's general anxiety and emotionality levels by asking them or their parents, so that children can receive effective intervention for pain and fear. Investing in proper intervention today is likely to pay off tomorrow in enhanced coping and reduced fear and avoidance of future care.

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REFERENCES

1. Jay SM, Ozolins M, Elliott CH, Caldwell S. Assessment of children's distress during painful medical procedures. Health Psychol 1983;2:133-47.
2. Cohen LL, Blount RL, Cohen RJ, Ball CM, McClellan CB, Bernard RS. Children's expectations and memories of acute distress: Short-and long-term efficacy of pain management interventions. J Pediatr Psychol 2001;26:367-74.
3. Ornstein PA, Manning EL, Pelphrey BA. Children's memory for pain. Dev Behav Pediatr 1999;20:262-77.
4. Salmon K. Commentary: Preparing children for medical procedures: Taking account of memory. J Pediatr Psychol 2006;31:859-61.
5. von Baeyer CL, Marche T, Rocha EM, Salmon K. Children's memory for pain: Overview and implications for practice. J Pain 2004;5:241-9.
6. Badali MA, Pillai RR, Craig KD, Giesbrecht K, Chambers CT. Reliability and accuracy of children's and parents' memory for a novel pain experience. Pain Res Manag 2000;5:161-8.
7. Zonneveld LNL, McGrath PJ, Reid GJ, Sorbi MJ. Accuracy of children's pain memories. Pain 1997;71:297-30.
8. Gedney JJ, Logan H. Pain related recall predicts future pain report. Pain 2006;121:69-76.
9. Pate JT, Blount RL, Cohen LL, Smith AJ. Childhood medical experience and temperament as predictors of adult functioning in medical situations. Child Health Care 1996;25:281-98.
10. Weisman SJ, Bernstein B, Schechter NL. Consequences of inadequate analgesia during painful medical procedures. Arch Pediatr Adolesc Med 1998;152:147-9.
11. Versloot J, Veerkamp JSJ, Hoogstraten J. Children's self-reported pain at the dentist. Pain 2008;137:389-94.
12. Huq AH, Lindsay SJE, Roberts JF. Children's expectations of discomfort associated with dental treatment. Int J Paediatr Dent 1992;2:11-6.
13. Lander J, Hodgins M, Fowler-Kerry S. Children's pain predictions and memories. Behav Res Ther 1992;30:117-24.
14. Buss AH, Plomin R. Temperament: Early Developing Personality Traits. Hillsdale: Erlbaum, 1984.
15. Spielberger CD, Edwards J, Lushene R, Montuori J, Platzek D. The State Trait Anxiety Inventory for Children (STAIC) Preliminary Manual. New York: Consulting Psychologists Press, 1973.
16. Arntz A, Claassens L. The meaning of pain influences its experienced intensity. Pain 2004;109:20-5.
17. Arntz A, Van-Eck M, Heijmans M. Predictions of dental pain: The fear of any expected evil is worse than the evil itself. Behav Res Ther 1990;28:29-41.
18. Schechter NL, Berstein BA, Beck A, Hart L, Scherzer L. Individual differences in children's response to pain: Role of temperament and parental characteristics. Pediatrics 1999;187:171-7.
19. Jensen B, Stjernqvist K. Temperament and acceptance of dental treatment under sedation in preschool children. Acta Odontol Scand 2002;60:231-6.
20. Boyce WT, Barr RG, Zeltzer LK. Temperament and the psychobiology of stress. Pediatrics 1992;90:483-6.
21. Conte PM, Walco GA, Kimura Y. Temperament and stress response in children with juvenile primary fibromyalgia syndrome. Arthritis Rheum 2003;48:2923-30.
22. Rocha EM, Prkachin KM. Temperament and pain reactivity predict health behaviour seven years later. J Pediatr Psychol 2006;32:393-9.
23. Rocha EM, Prkachin KM, Beaumont SA, Hardy C, Zumbo B. Pain reactivity and somatization in kindergarten-aged children. J Pediatr Psychol 2003;28:47-57.
24. Blishen BR, Carroll WK, Moore C. The 1981 socioeconomic index for occupations in Canada. Can Rev Sociol Anthropol 1987;24:465-88.
25. Hicks CL, von Baeyer CL, Spafford PA, Goodenough B. The Faces Pain Scale – Revised: Toward a common metric in pediatric pain measurement. Pain 2001;93:173-83.
26. Gasman I, Purper-Ouakil D, Michel G, et al. Cross-cultural assessment of childhood temperament: A confirmatory factor analysis of the French Emotionality Activity and Sociability (EAS) Questionnaire. Eur Child Adolesc Psychiatry 2002;11:101-7.
27. Gjone H, Stevenson J. A longitudinal twin study of temperament and behaviour problems: Common genetic or environmental influences? J Am Acad Child Adolesc Psychiatry 1997;36:1448-56.
28. Boer F, Westenberg PM. The factor structure of the Buss and Plomin EAS Temperament Survey (parental ratings) in a Dutch sample of elementary school children. J Pers Assess 1994;62:537-51.
29. Wachtel J, Rodrigue JR, Geffken GR, Graham-Pole J, Turner C. Children awaiting invasive medical procedures: Do children and their mothers agree on child's level of anxiety? J Pediatr Psychol 1994;19:723-35.
30. Bruck M, Ceci SJ, Fancoeur E, Barr RJ. "I hardly cried when I got my shot!" Influencing children's reports about a visit to a physician. Child Dev 1995;66:193-208.
31. Chen E, Zeltzer LK, Craske MG, Katz ER. Alteration of memory in the reduction of children's distress during medical procedures. J Consult Clin Psychol 1999;67:481-90.
32. Mechanic D. The experience of reporting common physical complaints. J Health Soc Behav 1980;21:146-55.
33. Cassady JF Jr, Wysocki TT, Miller KM, Cancel DD, Izenberg N. Use of a preanesthetic video for facilitation of parental education and anxiolysis before pediatric ambulatory surgery. Anesth Analg 1999;88:246-50.
34. Spafford PA, von Baeyer CL, Hicks CL. Expected and reported pain in children undergoing ear piercing: A randomized trial of preparation by parents. Behav Res Ther 2002;40:253-66.