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Children's coping with pain during dental care

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Abstract – *Objectives:* The purpose of this study was (i) to assess the coping strategies of 11-year-old children when dealing with pain at the dentist, (ii) to determine the extent to which the level of the children's dental fear and their experience with pain at the dentist are related to their ability to cope and their choice of strategies, and (iii) to analyse the possible differences between subsamples concerning dental caries. *Methods:* The coping strategies were investigated using the Dental Cope Questionnaire ($n = 597$); the level of dental fear was assessed using the Children's Fear Survey Schedule (CFSS-DS); a question is asked whether a child had experienced pain at the dentist in the past and dental caries was assessed using the DMFS index. *Results:* The results show that 11-year olds use a variety of coping strategies. Internal strategies are used most frequently, external coping strategies are used less frequently, and destructive strategies are hardly used. The subjects rate internal and external strategies as effective. Children with pain experience and fearful children use more coping strategies, with fearful children using more internal strategies. Reported pain and anxiety were related to the dental status. *Conclusions:* The use and choice of coping strategies seems to be at least partly determined by the level of dental fear and the child's experience with pain.

Key words: children; coping; dental anxiety; pain

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Introduction

Many children find dental visits to be stressful, partly because several aspects of dental treatment remind them of earlier dental or medical treatments that had been uncomfortable or painful. This can result in a variety of anxiety reactions (1). Rachman (2) proposed a model in which he described three pathways of fear acquisition: directly through classical conditioning, and indirectly via modeling or transmission of negative information. So far, no support for a simple, straightforward cause-and-effect conditioning relation has been found. One reason may be that the conditioning pathway is mediated by the aversion towards the stimuli and by the children's ability to cope, which in turn may be influenced by other factors. A child's ability to cope does indeed seem to, at least partly, determine the emotional nature of a dental visit (3).

Two main coping strategies can be identified for dealing with stressors: behavioral and cognitive. Behavioral coping efforts are overt physical or verbal activities that may be quite apparent to the dentist, such as keeping one's mouth shut or trying to get out of the dental chair. Cognitive coping efforts involve the manipulations of one's thoughts or emotions, such as when a child thinks of reassuring thoughts. These efforts tend to be silent or covert and may not be readily apparent to the dentist (4).

A child's ability to use various coping strategies is influenced by many factors (e.g. age, training, cognitive development, and parental support). The strategies young children (4–7 years) use at the dentist are generally behavior orientated. Children in the middle age group (8–10 years) start to supplement, but not replace, behavioral strategies with an increasing repertoire of cognitive strategies. Older children

(11–18 years) tend to use more cognitively orientated strategies and demonstrate more self-control when dealing with a stressor (5). Because older children may have a more extensive coping repertoire than younger children, they may have a greater ability to deal with stressful events (6). Cognitive coping efforts, although silent and often unnoticed, may play a major role in the child's ability to deal successfully with dental treatment, and to generate a lasting positive impression of the dental experience. An awareness and understanding of these processes could enable dentists to stimulate children's use of coping responses, thereby creating a more positive treatment situation.

Research on children's coping with pain is limited. Consequently, little is known about the strategies children are able to use spontaneously in attempting to adjust either the pain-producing situation or their own experience of pain. Not much is known about the relation between a child's level of dental fear and its coping style. One study assessing differences between exhibited active or passive coping behaviors and reported medical fear levels found no significant difference (7).

The aim of the present study was:

- To investigate the coping strategies which the 11-year-old children use when they are in pain at the dentist and how they judge their effectiveness.
- To study the extent to which the level of children's dental fear and their experience with pain at the dentist, relates to their ability to cope and their choice of coping strategies.
- To analyse the possible differences between subsamples of children with different levels of dental caries, expressed by DMFS index.

Materials and methods

Subjects

For this study, 597 Flemish primary schoolchildren (55% boys) were involved. Their mean age at the time of examination was 11.25 years (SD = 0.58). This sample served as a control group for the Signal-Tandmobiel®' project. For this project a cohort ($n = 4468$) of Flemish schoolchildren born in 1989 was selected from school data. Ethical approval was obtained for this project by the local ethics committee and the Education Department in Flanders (8).

Dental Cope Questionnaire

The Dental Cope Questionnaire (DCQ), a self-report checklist, requires the child to think about a painful situation at the dentist and to assess which coping strategies it would use. It is a revised version of the Kidcope (9), developed for this study to obtain a specific pain cope questionnaire for children. The scale consists of 15 coping strategies (for all items see Table 1) related to the dental setting, such as 'telling myself it will be soon over', 'thinking about something else', 'get angry with the dentist'. The child is asked to rate both use of each strategy (part A), scoring: 'yes' or 'no', and perceived effectiveness, (part B) of each strategy, scoring: 'not at all', 'a little', 'a lot'.

The Dental Subscale of the Children's Fear Survey Schedule

To assess the level of dental fear the children were asked to complete the Dental Subscale of the Children's Fear Survey Schedule (CFSS-DS). The CFSS-DS consists of 15 items to be answered on a five-point scale: 1, 'not afraid at all' to 5, 'very afraid', resulting in a possible score ranging from 15 to 75. Previous research has indicated scores below 32 as 'non-clinical', scores between 32 and 38 as 'borderline range', and scores of 39 and higher represent 'clinical range' or dental fear. Of the Dutch child population, 14% suffers from some degree of dental fear (10). Therefore, in the present study, a cut-off score of 32 on the CFSS-DS was used to divide children into low-fearful and fearful categories. In addition, all children were asked to also answer the question 'Did you ever experience pain at the dentist', on a three-point scale ('no', 'sometimes', and 'often').

Dental status

The DMF index is used to measure dental caries. It is a record of the number of decayed (D), missing because of caries (M), or filled (F) teeth. The DMF index can be applied to teeth (designated as DMFT) or to surfaces (DMFS). For the present study, the status of the teeth is coded at surface level, using the guidelines proposed by the British Association for the Study of Community Dentistry [BASCD (11)].

Procedure

The questionnaires DCQ and CFSS-DS were completed at school and the dental status was obtained during dental examination as part of the Signal-Tandmobiel®' project. For different reasons,

Table 1. Percentage of 11-year-old children reporting different coping strategies and subjective reports of their efficacy, based on the Dental Cope Questionnaire (DCQ)

When I am in pain at the dentist… ($n = 597$)	Yes (%)	When yes, does it help?	
		Not at all	A bit or very much
Destructive			
I get angry at mum and dad	6.1	50.0	50.0
I think of a reason to sneak out	7.4	45.0	55.0
I close my mouth	7.9	30.8	69.2
I get angry at the dentist	8.5	43.2	56.8
External			
I look at the mirror	25.6	36.2	63.8
I like it when the nurse holds my hand	38.6	5.4	94.6
I like it to have friends with me	43.4	11.2	88.8
I tell the dentist	52.0	16.7	83.3
I ask the dentist what he is doing	56.5	12.9	87.1
Internal			
I think it is part of dentistry	59.4	27.3	72.7
I tell myself it will be over soon	59.5	9.8	90.2
I think of other things	70.1	7.5	92.5
I think it is my own fault I have cavities	71.3	33.2	66.8
I think it is good for my teeth	79.0	8.6	91.4
I do what the dentist tells me to	97.1	11.9	88.1

29% of the children who completed the questionnaires were not seen at the dental examination.

Statistical analysis

To test the internal consistency of the DCQ, reliability analysis (alpha) was performed (Cronbach's alpha). Pearson's correlation coefficient was used to calculate the relation between use and perceived effectiveness of the strategies. The appropriate *t*-tests and chi-square tests were performed to assess differences in the strategies used.

Results

On average, subjects said they used 6.1 (SD 2.1) strategies in response to dental pain. The three most frequent coping strategies were 'I do what the dentist tells me to' (97%), 'I think it is good for my teeth' (79%), and 'I think it is my own fault I have cavities' (71%). These data are detailed in Table 1. The three most effective strategies when looking at the sum of response categories: 'a bit' and 'very much' are: 'I like it when the nurse holds my hand' (94.6%), 'I think of other things' (92.5%), and 'I think it is good for my teeth' (91.4%). The reported effectiveness of a strategy was taken into account only when a child reported having used it. Overall, there is a strong correlation between the percentage of children that does use a strategy and the rated efficacy of that strategy ($r = 0.72$). In other words, the strategies used more often are also the strategies that are rated helpful when one is coping with pain.

The internal consistency of the DCQ proved to be moderate; Cronbach's alpha was 0.61 for the total questionnaire, 0.49 for part A, and 0.79 for part B. Because of the moderate values, the choice was made to perform an exploratory factor analysis. Based on this analysis and the frequency with which each item was used the strategies were divided into three groups: (i) strategies that were used by <10% of the subjects; (ii) strategies that were used between 10 and 57%; and (iii) strategies that were used over 57% (see Table 1).

For each group an underlying component could be identified. The first group consists of destructive strategies. These are strategies which are unhelpful for the treatment such as getting angry or closing one's mouth. The efficacy rate of these strategies is 57.7%; this is the percentage of children that indicated that the strategies helped a bit or very much. The second group consists of strategies where the use of mechanical tools (e.g. mirror) or the presence of a person (external help) is applied to cope. The efficacy rate of these strategies is 84.8%. The third group consists of strategies that use internal help to cope. These are the more cognitive-orientated strategies which help to counteract negative feelings. The efficacy rate is 83.6%.

The mean fear level of the children in this study was 22.9 (SD 6.6). The mean score of the low-fearful children (below 32) was 21.2 ($n = 505$). The mean

fear score of the children with a score in the borderline range (between 32 and 38) was 35.0 ($n = 35$) and the mean fear score of the children with a score in the clinical range (39 and above) was 42.8 ($n = 21$). Girls were found to be more fearful than boys (24.0 versus 21.9, $P < 0.01$). Questionnaires not totally completed were excluded from analysis ($n = 38$). Children who reported to have experienced pain at the dentist in the past were more fearful than children who did not. The mean fear level of children who never experienced pain at the dentist is 21.3, the mean for children who sometimes experienced pain is 23.2, and the mean for children who often experienced pain is 29.6 ($F = 15.2$, $P < 0.01$).

Furthermore, a significant difference was found in the number of coping strategies used by fearful and low-fearful children, the first group using more coping strategies. Fearful children use more external coping strategies and find these strategies more effective than low-fearful children (Table 2). Fearful children use the strategy: 'I think of a reason to sneak out' more often and 'I like it when the nurse holds my hand' less often than low-fearful children.

In addition, there was a difference in the amount and type of coping strategies used between children who reported to have never experienced pain at the dentist (no pain, $n = 151$) and children who reported to have experienced pain at the dentist (pain; sum of answer categories 'sometimes' $n = 377$ and 'often' $n = 23$). The latter group used more internal coping strategies and find external as well as internal strategies more effective than children without pain experience (differences can be seen in Table 2).

The results on subjects' dental status for fearful and low fearful and pain and no-pain subsamples are presented in Table 3. Fearful children were found to have more diseased surfaces on their permanent teeth than low fearful children ($F = 48.28$, $P \leq 0.01$). Children who had experienced pain at the dentist (pain) were found to have more filled surfaces on their permanent teeth than children who reported never to have had pain at the dentist (no pain) ($F = 18.73$, $P \leq 0.01$).

Discussion and conclusions

The results of this study show that 11-year olds use a variety of coping strategies. Three groups of strategies could be formed and for each group a clear underlying component could be identified. Internal strategies are used most frequently and these strategies are rated by the children as effective. The external coping strategies are used less frequently but when used they too are often rated as being effective. The destructive strategies are hardly used but, on average, 45% of the users think they work effectively.

Earlier studies, among adults, stated that the nature of the situation plays an important role in determining the types of coping responses used. When individuals feel something constructive can be done to change the stressor, they tend to use problem-focused coping responses (e.g. work situations favor problem-focused coping). Stressful circumstances that are viewed as unavoidable and must be tolerated ask for emotion-focused coping (12). A dental treatment resembles this situation and thus demands emotion-focused coping. This seems congruent with our results, which shows that internal orientated strategies are used most frequently.

The use and choice of coping strategies seems to be partly determined by the level of dental fear. Fearful children use more coping strategies and use

Table 2. Dental anxiety, pain, and coping strategies in 11-year-old children

		LF ($n = 505$)		F ($n = 56$)		No pain ($n = 151$)		Pain ($n = 400$)	
	Score range	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Total CFSS-DS score	15–75	21.2	4.3	37.9*	4.9	21.3	5.6	23.5*	6.8
Coping strategies	0–15	6.1	2.0	7.1*	1.6	5.8	2.0	6.3*	1.9
Destructive coping strategies	0–4	0.3	0.63	0.5	0.79	0.28	0.69	0.28	0.61
External coping strategies	0–5	2.1	1.3	2.8*	1.2	1.9	1.4	2.1	1.3
Internal coping strategies	0–6	4.2	1.4	4.6	1.2	3.8	1.6	4.4*	1.3
Efficacy of destructive coping strategies	0–4	0.1	0.42	0.2	0.50	0.11	0.37	0.15	0.45
Efficacy of external coping strategies	0–5	1.6	1.3	2.3*	1.2	1.4	1.3	1.8*	1.2
Efficacy of internal coping strategies	0–6	3.3	1.8	3.8	1.6	2.9	1.8	3.5*	1.7

LF: low fearful, F: fearful; *significant at $P \leq 0.01$; CFSS-DS: Dental Subscale of the Children's Fear Survey Schedule.

Table 3. Fear and pain in 11-year-old children versus their caries experience (DMFS index)

	$n = (424)$		LF ($n = 352$)		F ($n = 41$)		No pain ($n = 117$)		Pain ($n = 275$)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Decayed Surfaces	0.37	1.59	0.24	0.88	1.29*	3.78	0.20	0.72	0.40	1.73
Filled surfaces	0.89	2.06	0.87	2.04	0.71	1.57	0.50	1.81	1.11**	2.18
Decayed and filled surfaces	1.26	2.61	1.11	2.26	2.00	4.06	0.69	2.14	1.51**	2.74
Decayed, missing and filled surfaces	1.41	2.98	1.24	2.64	2.15	4.16	0.79	2.55	1.64**	3.01

LF: low fearful, F: fearful. *Significant difference between low fearful and fearful at $P \leq 0.01$. **Significant difference between no pain and pain at $P \leq 0.01$.

more frequently externally focused coping strategies than low fearful children. This finding does suggest that fearful children lack personal resources for managing pain and are dependent on the skill of their parents and professional staff to teach them and enhance their coping skills. Information from the dental records of the patients made clear that our group of fearful children did have more decayed teeth than low fearful children. This might suggest that fearful children postpone their visit to the dentist in an attempt to avoid treatment.

The use and choice of coping strategies seems to be also determined, at least partly, by the level of pain experience. Children with pain experience use more coping strategies and use a broader range of strategies. One possible reason is that because of their pain experience they are forced to actively deal with the situation and as a result start to use new strategies. The pain experience of the children seems to be a consequence of restoring permanent teeth. Children who reported to have experienced pain at the dentist have more restored surfaces than those who did not.

The present study gives support for a relation between pain experiences and level of dental fear in children. Children who did experience pain in the past are more fearful. However, the relation between pain and dental fear is not straightforward. As mentioned before, dental fear is a complex phenomenon and there is no straightforward cause and effect relation known for fear acquisition (3).

Finally, our results indicate that the validity of the DCQ is moderate. Earlier studies have shown (7) that children who displayed active or action-oriented coping behaviors (i.e. asked questions, attempted to control, and resisted) reported less pain during lumbar puncture than children who used passive coping behaviors (i.e. ignored staff, remained silent and motionless, and cooperated without complaint). Indeed, the relation between pain perception during an actual dental treatment and the use of certain coping strategies also deserves additional research attention.

From the present study, it can be concluded that the use and choice of coping strategies of 11-year-old children seems to be at least partly determined by their level of dental fear and their pain experience. Dentists' treatment strategies should therefore not only consist of training the child's coping abilities, but also adapt his/her treatment to the level of anxiety or the expected amount of pain during treatment.

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References

1. Venham LL, Bengston D, Cipes M. Children's response to sequential dental visits. J Dent Res 1977;56:454–9.
2. Rachman S. The conditioning theory of fear acquisition: a critical examination. Behav Res Ther 1977;15:375–87.
3. ten Berge M. Dental fear in children: prevalence, etiology and risk factors. PhD thesis, University of Amsterdam; 2001.
4. Curry SL, Russ SW, Johnsen DC, DiSantis TA. The role of coping in children's adjustment to the dental visit. ASDC J Dent Child 1988;55:231–6.
5. Branson SM, Craig KD. Children's spontaneous strategies for coping with pain: A review of the literature. Can J Behav Sci/Rev Can Sci Comp 1988;20:402–12.
6. Hodgins MJ, Lander J. Children's coping with venipuncture. J Pain Symptom Manag 1997;13:274–83.

7. Broome ME, Bates TA, Lillis PP, McGahee TW. Children's medical fears, coping behaviors, and pain perceptions during a lumbar puncture. Oncol Nurs Forum 1990;17:361–7.
8. Vanobbergen J, Martens L, Lesaffre E, Declerck D. The Signal-Tandmobiel® project, a longitudinal intervention health promotion study in Flanders (Belgium): baseline and first year results. Eur J Paed Dent 2000;2:87–96.
9. Spirito A, Stark LJ, Williams C. Development of a brief coping checklist for use with pediatric populations. J Pediatr Psychol 1988;13:555–74.
10. ten Berge M, Veerkamp JS, Hoogstraten J, Prins PJ. Childhood dental fear in the Netherlands: prevalence and normative data. Community Dent Oral Epidemiol 2002;30:101–7.
11. Pitts NB, Evans DJ, Pine CM. British Association for the Study of Community Dentistry (BASCD) diagnostic criteria for caries prevalence surveys – 1996/97. Community Dent Health 1997;14(Suppl. 1):6–9.
12. Folkman S, Lazarus RS. An analysis of coping in a middle-aged community sample. J Health Soc Behav 1980;21:219–39.