Relationship Between Needle Phobia and Dental Anxiety

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ABSTRACT

Purpose: This cross-sectional study aimed to explain the nature of needle phobia and its relationship in dental phobic children with evidence on age-related differences.

Methods: The study used 2,865 patients (52% boys, 48% girls), 4 to 11 years old (mean=7.18 years). The patient sample included randomly selected patients (N=2,153) and an anxious group of children (N=712). Children were divided into 3 age groups (4-6, 7-9, and 10-11 years). The Children Fear Survey Schedule – Dental Subscale (CFSS-DS) was used to assess age-related needle phobia (CFSS-DS question 3) and dental anxiety. Children were arranged into 3 anxiety groups (cutoffs=scores of 25 and 37). Children who scored >37 were considered needle-phobic. Statistical analysis was performed using Statistics for Windows 10.

Results: Needle phobia progressively decreases with increasing age (19% of 4- to 6-year-old vs 11% of 10- to 11-year-old needle phobics; $P \leq 05$). Stepwise regression analysis revealed needle phobia does not primarily seem to be related to dental anxiety. Other aspects, like having had someone examine the mouth and the dentist drilling, contribute the most to dental anxiety in both low- and high-anxiety children. Fear of doctors is more specific for high-anxiety children ($P \leq 05$). A significant age-related difference regarding needle phobia is found between children ages 4 to 6 and 7 to 9 and between children ages 4 to 6 and 10 to 11 ($P \leq 001$).

Conclusions: Needle phobia is age related, but should be considered a separate phenomenon. It is not specific for dental anxiety and is related to other painful treatment. (*J Dent Child*. 2004;71:201-205)

KEYWORDS: DENTAL ANXIETY, NEEDLE PHOBIA

Dental anxiety and associated fear-related behaviors are one of the most difficult aspects of child dental patient management. Most studies on dental anxiety have revealed dental fear is strongly related to invasive procedures, rather than to social factors or the interactions between them.[1,2] Dentally anxious behavior in children is associated more with direct conditioning or vicarious learning than psychological factors.[3]

Studies suggest a multifactorial etiology of dental anxiety.[4] Associated factors are related to a child's fear disposition, negative emotions, pain sensitivity, and coping style, with the latter being related to parental attitudes, negative information, and painful experiences (Table 1).[5] There is no straightforward, single-cause consequence explanation of dental fear. It is the result of an interaction of different factors in which direct conditioning seems to play the most important role.[6-9]

A high level of dental fear or even phobia might develop in early childhood. In infancy, children are generally more fearful of stimuli appearing immediately in their direct surroundings or those related to a concrete stimulus. With increasing age, their fears become more associated with anticipatory events based on direct experience.[10] Development into the school years, especially between the ages of 6 and 12, coincides with fears related to bodily injury.[10-12] One might hypothesize that different aspects of dental treatment might evoke anxiety at different age/developmental levels.

Invasive treatment studies report different predictors, varying with the child's anxiety level, of which the drill and injection seem to be highly stressful in producing pain during dental treatment.[9,13] Based on invasiveness of treatment, procedures can be ranged and the strongest fears are caused due to injection, followed by the drill and removal of calculus.[1,14] The most common sources of directly anticipated fear are invasive medical or dental experiences because of their pain-related etiology.

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Pain is generally considered to be subjective and the result of tissue injury. It is modulated by neural mechanisms which subserve the transmission of nocioceptive information, including spontaneous pain and hyperalgesia.[15] Depending on physiological pain states on some occasions (eg, by abnormal triggering), the normal pain thresholds can become reduced or exaggerated.[16]

Modern dentistry is based on pain-free treatment, yet is still associated with many anxious thoughts. Recent approaches tend to introduce more sophisticated methods using local anesthesia in pediatric dental patients.[17,18] Local anesthesia is inevitable in pain control and behavior management in pediatric dentistry. More evidence based on the age of onset of children's dental anxiety in relation to fear of injection is mandatory.

This cross-sectional study aimed to show the extent to which the needle participates in the etiology of child dental anxiety.

METHODS

PATIENT SAMPLE

This study sample comprised 2,865 children (52% boys, 48% girls). The sample included a normative group of randomly selected child dental patients (N=2,153) and, since the subject of this study focused on a specific anxiety, an anxious group of children (N=712). The latter were referred to the Special Dental Care Clinic in Amsterdam because of:

1. their manifested phobic predisposition toward the dentist and invasive dental treatments;
2. a painful experience or behaviour managemental problems after their general practitioner had tried to perform dental treatment.

Children's age ranged from 4 to 11 years (mean=7.18 years). To study the relation between age and needle phobia, children were divided into 3 age groups: (1) 4 to 6; (2) 7 to 9; and (3) 10 to 11 years old.

METHODS

The Children Fear Survey Schedule – Dental Subscale (CFSS-DS) questionnaire was completed by parents, usually the mother, on behalf of their children. Studies report few differences in larger epidemiological studies between the 2 versions.[5,19] Developed to assess specific dental fears, the CFSS-DS is a psychometric measure of proven reliability and validity predicting a child's anxiety regarding different aspects of dental treatment.[5,20-22] The questionnaire consists of 15 fear-related items, with proven internal consistency and reliability. The items are scored on a Likert-point scale varying from 1 (not fearful at all) to 5 (very fearful). The final scores range from 15 to 75 points. The items refer to very specific and invasive procedures of dental treatment, such as injection or drilling, but also to more general aspects of medical fear. According to the final CFSS-DS scores, different cutoff scores are reported in the literature, which, consequently, differentiate low- from high-anxiety children.[2,21-23]

In this study, children's dental anxiety was regarded as low, moderate, and high, depending on their total CFSS-DS scores (cutoff scores=25 and 37, respectively). CFSS-DS question 3, concerning needle anxiety, was considered the study's focus and was answered 2,077 times. In case CFSS-DS question 3 reached the highest level (5 points on a Likert scale), it was assumed those children were truly needle-phobic patients.

STATISTICS

Statistical analysis was performed using Statistics for Windows 10. Stepwise regression analysis was performed to evaluate the extent to which the item referring to needle phobia (CFSS-DS question 3) accounts for predicting a child's dental anxiety in the low- and high-anxiety groups. Cross-tabs were designed to give evidence for age-related differences regarding needle phobia. A graph was designed to show age-related differences in the mean scores regarding needle phobia. One-way ANOVA analysis and the post hoc Bonferonni test were performed to show the mean difference regarding needle phobia (CFSS-DS question 3) between groups.

RESULTS

NEEDLE PHOBIA AND AGE

For this study, 2,865 parents completed the questionnaire on behalf of their children, resulting in only 2,077 cases where the questionnaire was completed. In case of missing questions (1 or 2), the authors used average scores. In case higher numbers or question 3 were missing, the patient was excluded from the study.

Results referring to needle-phobic children (CFSS-DS question 3) are represented in Table 1, which demonstrates that the average level of needle anxiety slowly drops with increasing age: 19% of 4- to 6-year-olds vs 11% of 10-to 11-year-olds (P=.01), just as the number of children with needle anxiety goes down.

Gradual age-related decrease in dental anxiety, however, does not hold up if scores 4 ("very much afraid for the needle") and 5 ("needle-phobic") are combined (Table 1), indicating a more complex nature of needle phobia when the children's cognitive level starts to develop further.

NEEDLE PHOBIA AS A PART OF DENTAL ANXIETY

Stepwise regression was performed to:

1. reveal the origin and structure of the CFSS-DS regarding prediction of children's anxiety;
2. study to which extent fear for the needle (CFSS-DS question 3) attributes to the level of dental anxiety (Table 2).

Taking fear of dentists (CFSS-DS question 1) as a dependent variable, dental anxiety is 50% better explained in high-anxiety children compared to low anxious children (Table 2). The results of the stepwise regression analysis revealed that, for children from both the low- and high-anxiety groups, the dentist drilling (CFSS-DS question 8) and having had someone examine the mouth (CFSS-DS question 4) are the most important anxiety predicting situations (Table 2). Fear of doctors (CFSS-DS question 2) is a significant predicting factor

Table 1. Children's Needle Fear in Relation to Age*

Are you afraid of the needle? (N, %)†					
Age groups	Not at all (1)	A little bit (2)	Afraid (3)	Very much afraid (4)	Needle phobic (5)
A. 4-6 yrs (N=917)	104 (11%)	393 (43%)	147 (16%)	103 (11%)	170 (19%)
B. 7-9 yrs (N=900)	145 (16%)	401 (45%)	151 (17%)	70 (8%)	133 (15%)‡
C. 10-11 yrs (N=260)§	38 (15%)	119 (46%)	48 (19%)	26 (10%)	29 (11%)
Total (N=2,077)	287 (14%)	913 (44%)	346 (17%)	199 (10%)	332 (16%)

*One-way ANOVA, Bonferroni post-hoc test.
†P≤.05.
‡Statistically significant difference with group A at the 0.001 level.
§Statistically significant difference with group A at the 0.01 level.

Table 2. Origin and Structure of the CFSS-DS, Based on CFSS Scores for Low- and High-anxiety Groups*

	Low-anxiety group (CFSS-DS=15-25)†			High-anxiety group (CFSS-DS=37-75)†			
Item	*R* square	Beta	*P*‡	Item	*R* square	Beta	*P*‡
4	.145	.352	.000	4	.202	2.674	.000
8	.081	.885	.000	8	.286	1.041	.000
2	.185	.125	.053	2	.322	.651	.000
11	.204	4.198E-02	.519	7	.341	.898	.000
15	.213	–7.623E-02	.280	15	.345	.884	.000
6	.219	3.070E-02	.690	14	.351	.928	.000

*Stepwise regression analysis with CFSS-DS 1 as a dependant variable.
†CFSS2=doctors; CFSS4=having someone examine your mouth; CFSS6=having a stranger touch you; CFSS7=having somebody look at you; CFSS8=the dentist drilling; CFSS11=having somebody put instruments in your mouth; CFSS14=people in white uniforms; CFSS15=having the nurse clean your teeth.
‡P≤.05.

for the high-anxiety group, whereas it is borderline for the low-anxiety group (Table 2). Needle phobia (CFSS-DS question 3), however, neither significantly attributes to children's dental anxiety or distinguishes the low- from high-anxiety children (Table 2).

DISCUSSION

This study suggested needle phobia is age related, but cannot be regarded as a specific fear contributing to dental anxiety development.

Children whose scores reached the maximum level on a 5-point Likert scale of the CFSS-DS question 3 were considered needle-phobic, as a working hypothesis for calculations. Further differentiation on the true psychopathological nature of needle phobia in this age group is needed. It might be hypothesized that children still extremely anxious about injections at age 11 might develop into hardcore needle phobics.

The number of needle-phobic children (score=5), as well as the mean scores of children who have fear of the needle, decrease gradually as the children age (Figure 1). Conversely, an age-related decrease in needle anxiety cannot be proven if scores 4 and 5 of the CFSS-DS question 3 are combined (Table 1). It could be the result of a child's inability to differentiate the wording of those 2 choices, so some caution should be taken. It does, however, make clear that cognitive ripening might change the nature of needle phobia. Due to the cross-sectional nature of the study, the authors cannot exclude that the needle phobia cohorts between the age groups are changing. The discussion on the age-related aspects of needle anxiety might be more complicated than the straightforward age-related conditioning process.

This reported decrease in fear may be due to developmental changes and cognitive maturation.[24,25] When children get older, they may learn how to control or suppress their level of fear, as demonstrated by the decrease of inappropriate behavior.[26-28]

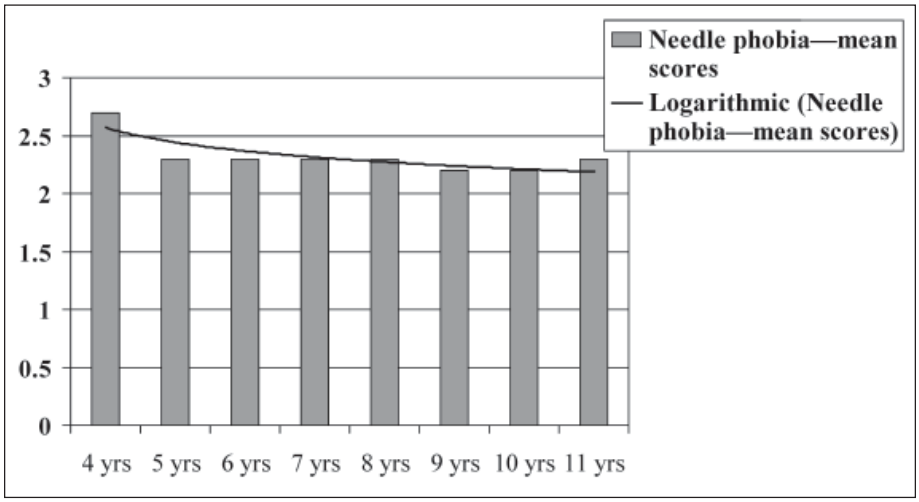

Figure 1. Needle phobia decreasing with age (N=2,077).

The high level of extreme needle anxiety in the youngest group can be related to bodily injury. Cognitive ripening and a subsequent better understanding might decrease this anxiety, leading to the development of anticipatory anxiety or fears of stimuli of an abstract nature.[29]

The results suggested needle anxiety does not play such an important role in general dental anxiety as expected. Fear for the needle, unlike some other aspects of dental treatment, does not distinguish the low- from high-anxiety children (Table 2).

A remarkably limited percentage of the variance significantly explained children's fear of dentists in both anxiety groups (Table 2). This needs

to be further investigated by using other methods or introducing and modifying existing ones in measuring the general dental anxiety level.

According to the results represented in Table 2, needle phobia does not seem to be associated only with invasive dental treatments. Apparently, it should be regarded as a separate phenomenon associated with fears acquired in other situations. Needle-phobic children should be questioned about the nature of their other fears, and a cause-consequence relationship regarding needle phobia should be investigated in other situations, particularly medical ones. It is important that the dentist is able to identify problematic levels of children's fears, which can help prevent other aspects of dental anxiety.

CONCLUSIONS

Needle phobia seems to be age related and progressively diminishes with increasing age, possibly due to cognitive maturation and the development of coping abilities. In this study, the authors were not able to address a straightforward age-related relation (eg, due to limited cognitive perceptions of the child). Generally, fear for the needle does not imply a high level of children's dental anxiety, although it is possible to diminish it by preventing fear of having received an injection before a dental procedure.

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