Developmental changes in dental anxiety in a normative population of Dutch children

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ABSTRACT. Aim: The aim of this study was to ascertain age and gender related differences that contribute to dental anxiety and to find relations with early onset of child dental anxiety in a population of 4-11 years old Dutch children.

Materials and methods: The study was conducted among 2,865 patients (48.2% girls) aged between 4 and 11 years old. The sample included a normative (n=2,153) and an anxious group of children (n=712), who were referred to the Special Dental Care Clinic in Amsterdam because of manifested dental phobia. Children were divided into three age groups (4-6, 7-9 and 10-11 years). Dental anxiety was assessed using the Children Fear Survey Schedule-Dental Subscale. Three levels of dental anxiety were used: low (CFSS-DS = 15-25), moderate (CFSS-DS = 26-36) and high (CFSS-DS above 37). Only children with CFSS-DS scores above 37 were considered dentally phobic.

Statistics: Statistical analysis was performed in Statistics for Windows 10.

Results: In the total group a significantly higher level of dental anxiety was found among girls (p=0.004; t=-3.262). There was a considerably lower number of dentally phobic boys (7.1%) and girls (9.2%) in the older group compared with the younger (51.8%, 52.8% respectively). One way Anova results revealed a statistically significant age related difference between the oldest and the youngest as well as the middle-aged groups (p<0.001, p=0.001). In general dental anxiety was explained better in the younger than in the older group. The regression analysis accounted for a higher percentage of the explained variance.

Conclusions: The study confirmed the highest level of dental anxiety was present at 4 years of age and an overall decrease in dental anxiety occurred as children became older. In different age groups, dental anxiety seems to be related to different aspects of dentistry, indicating the causes shift from simple initial stimuli to more complex events.

KEYWORDS: Child dental anxiety, Development, Age aspects.

Introduction

Dental anxiety is multifactorial. Research aims at many different aspects, with the purpose of creating tools for practitioners to seek effective and individual behavioural management strategies for different child populations. In general though, many different predisposing factors are involved in the aetiology of dental fear, anticipated fear of pain seems to be of great importance [Arntz et al., 1990]. Dental fear is strongly related to invasive procedures and associated conditioning processes, rather than to social factors or the interactions between them [Davey, 1989; Bedi et al., 1992; Veerkamp et al., 1992; Milgrom et al., 1995]. Dentally anxious behaviour in children is associated more with direct conditioning or vicarious learning, than with psychological factors [Locker et al., 1999]. In general an inverse relation with age seems to exist, giving room to the assumption that the older one becomes, the more time one has for good dental experiences to neutralize aversive dental events occurring at younger ages [Hagglin et al., 1996; Liddell and Locker, 1997]. Females report higher levels of dental fear, though the difference could not be duplicated for young children [ten Berge et al., 2002]. Some investigators have found that women appear to be at a greater disadvantage than men in perceived ability to cope with dental situations, because of a greater desire to control [Liddell and Locker, 1997].

It is assumed that 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, while with increasing age their fears become more

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associated with anticipatory events based on direct experiences [Gullone, 2000]. Development into the school years, especially between the ages of 6 and 12 years, coincides with the fears related to bodily injury [King et al., 1989; Gullone and King, 1997; Gullone, 2000].

Therefore, it might be hypothesised that different aspects of dental treatment might evoke anxiety at different age/developmental levels. As dental fear seriously interferes with and negatively affects dental treatment in young patients, the aim of this study was to ascertain age and gender related differences in factors contributing to dental anxiety among a young child Dutch population aged 4-11 years and to find relations with early and late onset of child dental anxiety.

Materials and methods

Subjects. The study was conducted among 2,865 patients (48.2% girls), whose age ranged from 4 to 11 years (mean 7.18). The patient sample included a normative group (n=2,153) and an anxious group of children (n=712), as the subject of the study focused on examining dental anxiety among highly fearful children. The normative group was formed by randomly selected Dutch children who were regular dental patients of the Academic Center for Dentistry (ACTA) in Amsterdam. The anxious group was formed of children who had been referred to the Special Dental Care Clinic in Amsterdam because of manifested dental phobia. Before filling in the questionnaires the parents gave their written approval for the study. Refusing an approval had no influence on the treatment performed. The study was part of the general ethical approval of the ACTA research school IOT. To study the causative relation between dental phobia and age, the children were divided into three age groups: 4-6, 7-9 and 10-11 years old.

Methods. For the purpose of this study the Children Fear Survey Schedule-Dental Subscale (CFSS-DS) was used, a questionnaire which measures specific dental fear [Cuthbert and Melamed, 1982]. Since its development, the CFSS-DS scale became quite a reliable instrument with an acceptable validity in evaluating children’s dental anxiety [Milgrom et al., 1995; ten Berge et al., 2002]. The questionnaire consists of 15 items related to various aspects of dental treatment, which can be scored on a 5-point Likert scale varying from 1 (not fearful at all) to 5 (dental phobic). The final scores range from 15 to 75. As to the final and cut-off scores, different levels of dental anxiety have been reported in the literature [Alvesalo et al., 1993; Milgrom et al., 1995]. In this study, three levels of anxiety were used: low (CFSS-DS = 15-25), moderate (CFSS-DS = 26-36) and high (CFSS-DS above 37). Highly anxious children who scored above 37 on the CFSS-DS questionnaire were considered dentally phobic.

Statistics. Statistical analysis was performed in Statistics for Windows 10. Stepwise regression analysis was performed to examine differences regarding factors predicting dental anxiety for both the youngest (4-6 years) and the oldest (10-11 years) groups of children. Taking CFSS-DS question 1 (fear of dentists) as a dependant variable, the sequence of CFSS-DS items was compared between the groups. Cross-tabs were designed to represent age related differences regarding dental anxiety. One-way Anova analysis and the post-hoc Bonferroni test were performed to represent age related differences between each group. A graph was designed to show age related differences in dental anxiety mean scores for the whole sample. An independent sample t test was used for the gender related differences in dental anxiety.

Results

Children’s dental anxiety in relation to age and gender. In the total group a significant difference in dental anxiety regarding gender was found, girls showing a higher level of dental fear than boys (p=0.004; t=-3.262) (Table 1). Age related differences for gender were indicative but not significant. There was a considerably lower number of dentally phobic boys in the oldest group (7.1%) than in the youngest group (51.8%) and a considerably lower number of dentally phobic girls in 10-11 years old (9.2%) in comparison with 4-6 years old (52.8%) (Table 1).

One-way Anova results revealed a statistically significant age related difference between the oldest (10-11 years) and the youngest (4-6 years) groups (p≤0.001) (Table 1). A significant age related difference was found between the middle aged (7-9 years) and the oldest (10-11 years) groups (p≤0.001) as well (Table 1).

The overall decrease in child dental anxiety is also shown in Figure 1. The highest dental anxiety level was present at the age of 4 years and slowly dropped as children became older, showing a remarkable tendency towards increasing again at the age of 11 years.
Age related onset of factors predicting dental anxiety. Taking fear of the dentists (CFSS-DS question 1) as a dependant variable, stepwise regression analysis revealed age related differences regarding factors predicting dental anxiety in 4-6 and 10-11 years old dentally anxious children (Table 2). For both the younger and the older groups, fear of doctors (dentists) (CFSS-DS question 2) was a significant factor in predicting dental anxiety. Fear of the dentist drilling (CFSS-DS question 8) was a statistically significant predictor regarding dental anxiety only for the older group (Table 2).

Fear of having had someone examine the mouth (CFSS-DS question 4) was significantly related to dental anxiety, but only for the younger children (Table 2). In general, at a young age the nature of the anxiety in dental situations seemed to be more related to age (strangers, unknown situations) than aspects specifically related to dental treatment.

The fear of having put instruments in the mouth (CFSS-DS question 11) was positioned on a high sequential level, explaining a limited additional percentage of the variance. It was a specific anxiety provoking factor for both age groups (Table 2).

In the younger group, the most specific item accounting for the highest percentage of the explained variance was fear of people in white uniforms (CFSS-DS question 14), while in the older group it was fear of choking (CFSS-DS question 12) (Table 2).

In general dental anxiety was better explained in the younger than in the older group. The regression analysis accounted for a higher percentage of the explained variance (Table 2).

<table>
<thead>
<tr>
<th>Gender (CFSS)</th>
<th>CFSS-DS scores</th>
<th>(N)</th>
<th>Age groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A=4-6 yrs</td>
<td>**B=7-9 yrs</td>
</tr>
<tr>
<td>Boys* (x=26.85)</td>
<td>Low=15-25</td>
<td>(554)</td>
<td>219 (39.5%)</td>
</tr>
<tr>
<td></td>
<td>Moderate=26-36</td>
<td>(227)</td>
<td>95 (41.9%)</td>
</tr>
<tr>
<td></td>
<td>High=37-75</td>
<td>(226)</td>
<td>117 (51.8%)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>(1,007)</td>
<td>431 (42.8%)</td>
</tr>
<tr>
<td>Girls* (x=28.30)</td>
<td>Low=15-25</td>
<td>(480)</td>
<td>163 (34%)</td>
</tr>
<tr>
<td></td>
<td>Moderate=26-36</td>
<td>(209)</td>
<td>104 (49.8%)</td>
</tr>
<tr>
<td></td>
<td>High=37-75</td>
<td>(250)</td>
<td>132 (52.8%)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>(939)</td>
<td>399 (42.5%)</td>
</tr>
</tbody>
</table>

*Statistically significant difference (t=-3.262, p=0.004) (Independent sample t test)
**Statistically significant difference with group A ( p< 0.001) (One-way Anova, Bonferroni post-hoc test)

Table 1 - Children’s dental anxiety dependant on age and gender in a normative population of Dutch children.

<table>
<thead>
<tr>
<th>CFSS-question</th>
<th>Age group 4-6 years</th>
<th>Age group 10-11 years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R Square</td>
<td>Beta</td>
</tr>
<tr>
<td>8</td>
<td>.588</td>
<td>2.896E-02</td>
</tr>
<tr>
<td>4</td>
<td>.701</td>
<td>-.111</td>
</tr>
<tr>
<td>2</td>
<td>.718</td>
<td>-.283</td>
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<tr>
<td>15</td>
<td>.726</td>
<td>-.266</td>
</tr>
<tr>
<td>11</td>
<td>.729</td>
<td>-.262</td>
</tr>
<tr>
<td>14</td>
<td>.730</td>
<td>-.234</td>
</tr>
</tbody>
</table>

p≤0.05; Stepwise regression with Question 1 (fear for the dentist) as dependent variable. The numbers refer to the questions of the CFSS.

Table 2 - Age related dental anxiety in a sequence of anxiety score items based on CFSS-DS scores in a normative Dutch child population.
prevalence of dental anxiety occurring among preadolescents (9-12 years) and adolescents (15-18 years) [Murray et al., 1989; Thomson et al., 1997].

The difference in factors explaining dental anxiety between the age groups might be due to a change in the nature of dental anxiety as the child grows older. In the youngest group dental anxiety seems to be merely a matter of a straightforward cause-consequence relation than the anticipation of a perceived pain of discomfort. Apart from this, other factors might be involved in the late onset of dental anxiety [Locker et al., 1999]. It is important to further investigate and give evidence on the psychopathological nature of true dental phobia in this group of children, since they might represent the most difficult dental patients regarding future dental treatments.

Basically the nature of childhood dental fears seems to depend on a child's age [Ferrari, 1986]. In this study it has been supported by the results of the stepwise regression analysis.

Fears considering more general aspects of dental treatment and those associated with medical situations appear to be more anxiety provoking than other procedures described by the CFSS-DS questionnaire (Table 2). A higher percentage of the explained variance in the younger group can be due to a higher level of fears expressed by younger children. Dental treatment experiences might be partly the source of more general fears reported by some children as well [Ollendick and King, 1991].

In contrast with other studies, these results indicate that drilling is an aversive dental procedure significant only for older children [Bernstein et al., 1979; Milgrom et al., 1995] Some findings indicate that a conditioning predisposition is stronger in younger and adolescent children, while others agree that psychological factors have a stronger impact on a later onset of dental anxiety [Milgrom et al., 1995; Locker et al., 1999].

The age problem is intriguing. In adults it has been found that females are generally more fearful than males [Peretz and Zadik, 1994]. Moreover, some studies based on general findings, widely represented in different cultures, have proved that women are more prone to neurotic behaviour involving anxiety, fear and worry. These findings may be viewed in light of previous reports and explained from a developmental aspect. With respect to dental anxiety, it has been proved that at the age of 2-3 years, girls exhibit more exploratory behaviour and appear more secure than boys [Rousset et al., 1997]. It may be indicated that this characteristic among females appears sometime later after early childhood [Klingberg et al., 1995].

**Discussion**

The results give evidence for a gradual decrease of the level of dental phobia, as well as a decrease in the number of dentally anxious children in different age groups (Fig. 1).

The results are also in concordance with some findings reporting on a general decrease of childhood fears with increasing age [Ollendick and King, 1991; Klingberg et al., 1994; Muris et al., 1996].

The high level of dentally anxious children in the younger age group can be viewed from a developmental perspective. Preschool children often exhibit anxious behaviour due to attachment and separation anxiety during the first visit, the latter decreasing after a few dental visits as the child becomes familiar with dental situations. The most simple, direct fears disappear and are exchanged by more complex events such as drilling, due to increased ego strength and a child's self esteem as he/she grows older. It results in decreasing dental anxiety as well, due to their decreasing constitutional vulnerability to anxiety provoking stimuli. The higher level of the explained variance in younger children might be indicative in explaining a stronger role of a direct conditioning pathway due to the limited cognitive abilities. A stronger cognitively orientated mind might be a mediator, but also plays an important role in the further development of dental anxiety, without the direct conditioning pathway being involved. Further research on this item is definitely needed.

The results of this study do not give support for the overall decrease. Considering the number of dentally phobic children still present in the older group and a tendency towards raising the level of dental anxiety at the age of 11 years, the results accounted for a change in dental anxiety pattern entering adolescence (Fig. 1). Some investigations have reported an increase in the prevalence of dental anxiety occurring among preadolescents (9-12 years) and adolescents (15-18 years) [Murray et al., 1989; Thomson et al., 1997].

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Conclusion

The results of the present study demonstrate that dental anxiety in children between 4 and 11 years decreases with increasing age and reports a difference in dental anxiety with respect to gender. At different age groups dental anxiety seems to be related to different aspects of dental treatment, indicating the causes shift from simple initial stimuli to more complex events. From a developmental perspective the decrease in children’s dental anxiety can be explained by the increased cognitive abilities. Nevertheless, the decrease is not linear over time and possibly depends on other aspects like different personality traits and conditioning processes, which need to be investigated further.

References


