Dental fear in children: prevalence, etiology and risk factors

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CHAPTER 4

CHILDHOOD DENTAL FEAR IN THE NETHERLANDS:
PREVALENCE AND NORMATIVE DATA

Abstract
This study aimed to present normative data on dental fear for the Dutch child population, by not only identifying highly fearful children but also children at risk for developing this high dental fear. Fear distribution of samples of high- and low fearful children was studied, using the Dutch parent’s version of the Dental Subscale of the Children’s Fear Survey Schedule (CFSS-DS). Total fear scores were calculated for both samples, for different age levels and for boys and girls separately. To establish cut-off scores, mean CFSS-DS scores were associated with dentists’ clinical fear ratings and in addition, were transformed into stanines. Scores between 32 and 38 were found to represent a borderline area for dental fear, and scores of 39 and higher to represent high dental fear. The results have shown 6% of the Dutch child population to be highly fearful, while another 8% may be at risk to develop high dental fear. By providing extra attention for these children the development of high dental fear or phobia may be prevented.

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Chapter 4

Introduction

Prevalence estimates of childhood dental fear vary considerably, from 3 to 43 percent in different populations (Alvesalo, Murtomaa, Milgrom, Honkanen, Karjalainen & Tay, 1993; Bedi, Sutcliffe, Donnan & McConnachie, 1992; Chellappah, Vignesha, Milgrom & Lo, 1990; Holst & Crossner, 1987; Klingberg, Berggren & Norén, 1994; Milgrom, Jie, Yang & Tay, 1994; Milgrom, Mancil, King & Weinstein, 1995). These differences in prevalence estimates may be due to several parameters such as methodological or cultural variables in the populations surveyed. For example, instruments used in these studies vary from behavioural rating scales to several forms of fear questionnaires such as the Dental Anxiety Scale (Corah, 1969) and the Dental Subscale of the Children’s Fear Survey Schedule (CFSS-DS; Cuthbert & Melamed, 1982). With respect to the populations studied, selective study samples are often used. For example, among large samples in (Western-) European countries less variance in prevalence estimates and lower mean CFSS-DS scores have been reported (Alvesalo et al., 1993; Bedi et al., 1992; Holst & Crossner, 1987; Klingberg et al., 1994), indicating possible cultural differences. The age range of the children constituting the samples also appears to be of influence on the fear levels found; repeatedly, childhood fears are reported to generally decrease with increasing age (Klingberg et al., 1994; Muris, Steerneman, Merckelbach & Meesters, 1996; Ollendick & King, 1991). However, others found peak fear scores at certain ages (Cuthbert & Melamed, 1982; Ferrari, 1986; McCathie & Spence, 1991; Strauss & Last, 1993), indicating that this overall decrease in fear may not be linear over time. For example, Cuthbert and Melamed (1982) suggested that fear distribution may be one of irregular changes over different age groups.

Childhood fears are often related to developmental changes in children and the nature of fears prominent in a child’s life also seems to depend on a child’s age (Ferrari, 1986; Prins, De Wit & Goudema, 1997). For a pre-schooler, attachment and separation anxiety often play an important role, whereas at a later age (from 8 years on) fear of bodily injury and social fears become more prominent. Most of these developmental age-appropriate fears decrease or disappear as children grow older, due to increased ego strength and the development of cognitive abilities providing a child with an adequate coping style. Accordingly, from a developmental perspective, young children are expected to suffer some degree of fear when visiting the dentist for the first time, possibly due to being separated from the mother, not understanding dental procedures or associating these with other, age-appropriate fears. In most children, this fear will probably decrease after visiting the dentist more often and after becoming habituated to the dental situation (Veerkamp, 1994). However, in a small subgroup of children fear seems to persist into adulthood and becomes chronic.
Prevalence of childhood dental fear

Given the great variety in prevalence reports, the present study was undertaken to establish normative data on the distribution and prevalence of dental fear among children in the Netherlands. Since in previous studies often limited or selective age groups were used, in this study children of a relatively wide age range (4-11 years) were included, to also assess possible age effects. Moreover, the aim of this study was not only to report on the prevalence of children suffering from high dental fear, but also to identify and report on children at risk for developing this high dental fear. In previous research, little attention has been given to this latter group of children, although it is particularly of interest in the prevention and treatment of dental fear. In addition, differences in the distribution and development of dental fear between a general sample of the Dutch child population and a referred group of children with high dental fear were studied, and age and gender differences were assessed. To enable comparisons with other countries, in the present study the CFSS-DS was used, a well-known instrument showing good reliability and validity and recently used in several countries in the study of childhood dental fear (Alvesalo et al., 1993; Chellappah et al., 1990; Klingberg et al., 1994; Milgrom et al., 1994, 1995).

Material and methods

Participants

General sample

During the period from January 1998 until April 1999 the parents of all children between 4 and 11 years of age treated in 14 general dental practices located in the Netherlands, were asked to participate. All parents were asked by the operating dentist to complete the CFSS-DS on behalf of their child before or during treatment. In several practices, an assistant was present reminding parents to complete the questionnaire, being prepared to help them in case of questions of problems. The parents were well informed on the purpose of the study and signed a consent form. Data were obtained for 2291 children; 147 children had to be excluded from the study. That is, 107 children did not fall in the selected age range (4-11) and for another 40 children answers to more than 4 items of the CFSS-DS were missing, mostly due to language problems. For the CFSS-DS questionnaires with less than 5 items missing, missing items were replaced using specific item means as replacement for the missing items. Mean item scores were calculated for age level and for boys and girls separately, and missing items were replaced by these mean item scores according to children's age level and gender. After this selection, questionnaires for 2144 children (1107 boys) could be used in the analyses. The mean age of the children was 7.2 years (SD 2.1). Of this group of children, 6.5 % (n=139) came from a non-Western cultural background; 60% was Turkish, 20% Moroccan and the other children came from a wide range of countries
such as Iraq, Iran and Lebanon. To check for possible sample selection through parental fear and subsequent avoidance of dentists, the parents were also asked to rate their own dental fear on a 5-point Likert scale from 1 “not afraid at all” to 5 “very afraid”. Of these parents, 27% reported to suffer from some degree of dental fear themselves (13% indicated to be fairly fearful, and another 14% to be highly fearful), indicating the risk of such selection to be small.

Referred sample
At the Centre for Special Dental Care (SBT) in Amsterdam data for 389 children (197 boys) aged 4 to 11 years were collected. The mean age of these children was 6.3 years (SD 1.9). All children were referred to the Centre because regular treatment was impossible due to their dental fear. After initial referral, the parents of the children were asked to complete the questionnaire at home, prior to their first visit at the clinic and to return it at their first visit. All parents were well informed on the purpose of the study and signed a consent form.

Measures
The fear level of the children was assessed using the Dental Subscale of the Children’s Fear Survey Schedule (CFSS-DS). The CFSS-DS was developed to provide an instrument for assessing dental fear in children; it is a revised form of the FSS-FC to include specific dental fear items as one of its subscales (Cutbert & Melamed, 1982; Scherer & Nakamura, 1968). The CFSS-DS consists of 15 items relating to different aspects of dental treatment; possible scores range from 1 “not afraid at all” to 5 “very afraid”. Total scores thus range from 15 to 75. The scale has proven to be reliable and valid (Klingberg, 1994; Klingberg et al., 1994; Ten Berge, Hoogstraten, Veerkamp & Prins, 1998). Previous research has provided cut-off scores between 37 and 42 indicating dental fear (Klingberg, 1994; Milgrom et al., 1994, 1995). Since younger children are unable to complete the CFSS-DS on their own and to enable comparisons between different ages, it was decided to use the parent’s version of the CFSS-DS. Earlier, indications were found that parents are well able to assess their child’s dental fear (Klingberg et al., 1994; Milgrom et al., 1994). The scale was adjusted to be answered by one of the parents of the children, and to obtain a valid Dutch version a two-way translation was made. In addition, the dentists were asked to rate the child’s dental fear during treatment on a similar 5-point Likert scale, ranging from 1 “not afraid at all” to 5 “very afraid”. All dentists agreed to participate in the study and were instructed on how to use the rating scale before starting the study. The dentists were unaware of the scores on the CFSS-DS questionnaires.
Data analysis

Mean total fear scores were calculated for all different age levels, for the general sample as well as for the referred sample. Analysis of variance (ANOVA) was performed to test the differences in fear scores between the different age groups (4-7 and 8-11 years), between boys and girls and cultural background. To obtain normative data, mean CFSS-DS scores were associated with the clinical fear rating by the dentist. For all levels of the dentists' ratings (from 1 "not afraid at all" to 5 'very afraid'), mean CFSS-DS scores were calculated. Ratings of 3 and higher are assumed to indicate a distinct level of dental fear in children. For children rated as 3, treatment may still be possible and effective. For children rated as 4 or 5, however, regular treatment is often interfered with. To verify the results obtained by this method, mean CFSS-DS scores were also transformed into stanines (Stouthard & Hoogstraten, 1990).

Results

General sample

The distribution of fear scores for the different age levels is shown in Table 1, for the total group as well as for boys and girls separately (see also Figure 1).

<table>
<thead>
<tr>
<th>age</th>
<th>n</th>
<th>mean</th>
<th>sd</th>
<th>n</th>
<th>mean</th>
<th>sd</th>
<th>n</th>
<th>mean</th>
<th>sd</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 years</td>
<td>220</td>
<td>25.7</td>
<td>9.4</td>
<td>123</td>
<td>24.5</td>
<td>8.2</td>
<td>*</td>
<td>97</td>
<td>27.4</td>
</tr>
<tr>
<td>5 years</td>
<td>267</td>
<td>24.6</td>
<td>8.7</td>
<td>139</td>
<td>23.6</td>
<td>7.7</td>
<td>128</td>
<td>25.7</td>
<td>9.6</td>
</tr>
<tr>
<td>6 years</td>
<td>365</td>
<td>23.7</td>
<td>7.6</td>
<td>181</td>
<td>22.9</td>
<td>6.9</td>
<td>*</td>
<td>184</td>
<td>24.5</td>
</tr>
<tr>
<td>7 years</td>
<td>351</td>
<td>24.0</td>
<td>8.1</td>
<td>174</td>
<td>23.8</td>
<td>7.7</td>
<td>177</td>
<td>24.1</td>
<td>8.4</td>
</tr>
<tr>
<td>8 years</td>
<td>285</td>
<td>23.3</td>
<td>7.3</td>
<td>154</td>
<td>23.5</td>
<td>8.5</td>
<td>131</td>
<td>23.0</td>
<td>6.7</td>
</tr>
<tr>
<td>9 years</td>
<td>315</td>
<td>23.3</td>
<td>7.3</td>
<td>166</td>
<td>22.5</td>
<td>6.9</td>
<td>*</td>
<td>149</td>
<td>24.2</td>
</tr>
<tr>
<td>10 years</td>
<td>207</td>
<td>23.5</td>
<td>8.1</td>
<td>103</td>
<td>23.6</td>
<td>8.3</td>
<td>104</td>
<td>23.5</td>
<td>7.8</td>
</tr>
<tr>
<td>11 years</td>
<td>134</td>
<td>22.9</td>
<td>7.5</td>
<td>67</td>
<td>22.2</td>
<td>7.2</td>
<td>67</td>
<td>23.6</td>
<td>7.8</td>
</tr>
<tr>
<td>total</td>
<td>2144</td>
<td>23.9</td>
<td>8.1</td>
<td>1107</td>
<td>23.4</td>
<td>7.6</td>
<td>**</td>
<td>1037</td>
<td>24.5</td>
</tr>
</tbody>
</table>

Table 1. Mean CFSS-DS scores for children from the general sample (n=2144), for the different ages (4-11 years) and for boys and girls separately. Significant differences between the sexes *p<.05, **p<.01

For the general sample, the children's mean total fear score is 23.9 (SD 8.1), where a higher score represents greater fear. Analysis of variance (2 x 2 x 2) revealed significant main effects of cultural background (F=27.75, p=.000) and gender (F=8.94, p=.003). Children from a non-Western cultural background scored significantly higher on the CFSS-DS than children from a Western cultural background, and girls scored higher than boys. No significant age effect or interaction effects were found (p>.05).
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Table 2 shows the mean fear scores on the items of the CFSS-DS, for the general as well as for the referred sample. The highest fear scores were found on the items ‘injections’, ‘drilling’ and ‘having to go to the hospital’.

Table 2. Mean CFSS-DS item and total scores (and standard deviations) for the general sample (n=2144) as well as the referred sample (n=389).

<table>
<thead>
<tr>
<th>items</th>
<th>general sample</th>
<th>referred sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mean</td>
<td>sd</td>
</tr>
<tr>
<td>1. dentists</td>
<td>1.6</td>
<td>0.9</td>
</tr>
<tr>
<td>2. doctors</td>
<td>1.5</td>
<td>0.7</td>
</tr>
<tr>
<td>3. injections</td>
<td>2.3**</td>
<td>1.0</td>
</tr>
<tr>
<td>4. having somebody examine your mouth</td>
<td>1.3</td>
<td>0.6</td>
</tr>
<tr>
<td>5. having to open your mouth</td>
<td>1.2</td>
<td>0.5</td>
</tr>
<tr>
<td>6. having a stranger touch you</td>
<td>1.5</td>
<td>0.7</td>
</tr>
<tr>
<td>7. having somebody look at you</td>
<td>1.4</td>
<td>0.6</td>
</tr>
<tr>
<td>8. the dentist drilling</td>
<td>2.2*</td>
<td>1.0</td>
</tr>
<tr>
<td>9. the sight of the dentist drilling</td>
<td>1.7</td>
<td>0.9</td>
</tr>
<tr>
<td>10. the noise of the dentist drilling</td>
<td>1.7</td>
<td>0.9</td>
</tr>
<tr>
<td>11. having somebody put instruments in your mouth</td>
<td>1.6</td>
<td>0.8</td>
</tr>
<tr>
<td>12. choking</td>
<td>1.6</td>
<td>0.8</td>
</tr>
<tr>
<td>13. having to go to the hospital</td>
<td>1.8</td>
<td>0.9</td>
</tr>
<tr>
<td>14. people in white uniforms</td>
<td>1.3</td>
<td>0.6</td>
</tr>
<tr>
<td>15. having the nurse clean your teeth</td>
<td>1.3</td>
<td>0.6</td>
</tr>
<tr>
<td>total mean score</td>
<td>23.9</td>
<td>8.1</td>
</tr>
</tbody>
</table>

** highest item mean score, * second highest item mean score

Referred sample

The mean total fear score for the referred sample is 40.2 (SD 12.9). The distribution of fear scores across the different age levels is shown in Figure 1. Highest fear scores were found for 8- and 9-year old children. Analysis of variance showed a significant main effect for gender (F=4.01, p=.046) but not for age. No interaction effects were found. Highest item scores were found on the items ‘drilling’, ‘injections’ and ‘dentists’ (see Table 2).

Cut-off scores

Several studies have established cut-off scores to associate CFSS-DS scores with a behavioural or emotional rating done by the dentist or the parents (Klingberg, 1994; Milgram et al., 1994, 1995). Replicating this method, in the present study mean CFSS-DS scores were related to the dentist’s clinical fear ratings. A score of 3 (fairly afraid) is assumed to reflect a distinct level of dental fear in children, while ratings of 4 and higher indicate extreme dental fear in children. By using this method a mean CFSS-DS score of 32.2 was obtained for children rated as 3 by the dentists, and a mean score of 39.4 was related to
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children rated as 4. Since the border between non-fearful and fearful is not always clear-cut in daily practice, it was decided to use these two cut-off points, which is often done in child psychology (Achenbach, 1991; Verhulst, Van Der Ende & Koot, 1996). Therefore, the area below CFSS-DS score 32 was defined as “non-clinical range”, the area between scores 32 and 38 as “borderline range” and the area of scores of 39 and higher as “clinical range”. Table 3 shows the mean CFSS-DS scores for all different levels of the dentists’ ratings, and the percentages of children scoring in these CFSS-DS ranges.

<table>
<thead>
<tr>
<th>Dentist rating</th>
<th>CFSS-DS</th>
<th>%</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>21.6</td>
<td>66</td>
<td>1408</td>
</tr>
<tr>
<td>2</td>
<td>25.2</td>
<td>20</td>
<td>430</td>
</tr>
<tr>
<td>3</td>
<td>32.2</td>
<td>8</td>
<td>180</td>
</tr>
<tr>
<td>4</td>
<td>39.4</td>
<td>4</td>
<td>77</td>
</tr>
<tr>
<td>5</td>
<td>47.4</td>
<td>2</td>
<td>49</td>
</tr>
</tbody>
</table>

Distribution of age and gender within the different cut-off ranges seems similar to that found in the total group; somewhat more girls than boys scored in the borderline (9% versus 7%) and clinical ranges (7% versus 5%). The mean age of the children scoring in the non-clinical range was somewhat higher than in the borderline and clinical range (7.8 versus 7.4 years).

To check these results a second, statistical, procedure was performed. CFSS-DS scores were transformed into stanines: a division of the distribution of scores in nine intervals with the theoretical distribution 4%, 7%, 11%, 17%, 22%, 17%, 11%, 7% and 4% of respondents (Stouthard & Hoogstraten, 1990). This division into stanines provides support for the findings of the first method; the cut-off scores seem to fall within the ranges obtained after transformation, taking into account that these scores reflect mean scores of groups. On the high dental fear side this theoretical division provided the following groups: scores of 42 and higher (highest 4%), between 34 and 41 (next 7%) and between 28 and 33 (next 12%). On the low dental fear side this distribution seems less fitting: 17% scored between 24 and 27, 27% between 20 and 23, 16% scored 18 and 19 and 18% below 18. Figure 1 shows these cut-off scores in relation to the mean fear levels of both samples, measured using the CFSS-DS. Herewith, support again seems to be provided for the level at which the cut-off scores have been set.
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**Figure 1.** Mean fear levels for the general sample and the referred sample, and CFSS-DS cut-off scores for dental fear.

![Graph showing mean fear levels and cut-off scores for dental fear across age groups.]

**Discussion**

The normative data obtained in the present study show that 14% of the Dutch child population suffers from some degree of dental fear, possibly interfering with dental treatment. Two cut-off points have been set representing different degrees of dental fear in children. CFSS-DS scores of 39 and higher (6%) were found to represent high dental fear in Dutch children, likely to interfere with treatment. In addition to this somewhat strict cut-off score, a borderline area for dental fear was set at scores between 32 and 38 (Achenbach, 1991; Verhulst, Van Der Ende & Koot, 1996). Children scoring in this range (8%) also suffer from some degree of dental fear or may be at risk for developing high dental fear or phobia. This group of children seems of special interest in the study of dental fear, since by providing extra attention and guidance for these children the development of high dental fear may be prevented. However, when interpreting these results it should be noted that also other factors might be involved. For some children the expression of their fear may depend on the circumstances and on temperamental factors. In other words, dental fear may not always be displayed as uncooperativeness, and vice versa, not all children showing uncooperativeness have to be dentally fearful (Klingberg & Broberg, 1998; Klingberg, Carlsson, Berggren & Norén, 1995; Ten Berge, Veerkamp, Hoogstraten & Prins, 1999). Although the CFSS-DS seems to give a good indication of the child’s fearful behaviour during treatment, situational or temperamental factors such as shyness or aggressiveness may be decisive in the expression of a child’s fear. Herewith the need for adequate
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assessments of dental fear as well as of concomitant problems is underlined, especially after referral to a Centre for Special Dental Care.

The results have shown an interesting difference in the level of fear between children from Western and from non-Western countries, which may partly explain differences in reported prevalence of childhood dental fear (Alvesalo et al., 1993; Chellappah et al., 1990; Milgrom et al., 1994, 1995). This level of dental fear seems to be higher in some cultures and therefore for these countries other cut-off scores may apply. However, the underlying factors for this difference are unclear and need to be studied in future research. No age effect was found in the present study. Previous research has resulted in inconsistent findings: several studies have reported that dental fear seems to decrease with increasing age (Holst & Crossner 1987; Klingberg et al., 1994, 1995; Raadal, Milgrom, Weinstein, Manci & Cauce, 1995), although it should be noted that often this reported relation is not very strong. This may be partly due to the fact that this relation may not be a linear one and that it may be affected by other aspects (Cuthbert & Melamed, 1982; Raadal et al., 1995; Rape, Bush & Saravia, 1988; Winer, 1982). More specifically, this reported decrease in fear may essentially represent a developmental change in children (Curry & Russ, 1985; Rape et al., 1988; Veerkamp, 1994; Winer, 1982). Increasing age in children is related to the development of cognitive abilities (Curry & Russ, 1985) and a change in the expression of fear. That is, children may learn to control the way they express their fear as they grow older, and subsequently, this may lead to the decrease of inappropriate behaviour perceived by others (Prins, 1994; Veerkamp, 1994). Comparisons between behavioural measures and anxiety ratings indeed seem to indicate such a discrepancy. That is, children's age was found to be related to (fearful) behaviour and not to anxiety reports (LeBaron & Zeltzer, 1984; Mekarski & Richardson, 1997). Thus, this might indicate that reported decreases in fear level in children might essentially represent a developmental change instead of an actual decrease in this level of fear. In the present study, girls were found to be somewhat more fearful than boys. These higher fear levels in girls were also found in earlier studies on childhood dental fear (Alvesalo et al., 1993; Bedi et al., 1992; Milgrom et al., 1995; Raadal et al., 1995) as well as in studies on other childhood fears (Ferrari, 1986; McCathie & Spence, 1991; Ollendick & King, 1991). It has been suggested that girls and younger children may feel more free to express and admit their fears due to cultural factors or associated stigmas (Ferrari, 1986). Accordingly, parents may be less likely to label boys as fearful in comparison with girls.

A comparison of the mean fear levels of the samples in this study provides clinical support for the validity of the CFSS-DS as well as for the level at which the cut-off scores are set in the present study. Scores on the CFSS-DS of 39 and higher indeed have led to referral to the Centre; for these children their dental fear has seriously interfered with regular
treatment by their home-dentist. Children of the general sample, on the other hand, generally scored in the non-fearful range. In conclusion, the results of this study are in agreement with previous research (Alvesalo et al., 1993; Klingberg et al., 1994; Milgrom et al., 1995) and, considering sample size, seem also indicative for other Western countries. Dental fear seems to start developing at a young age and for most children decreases with increasing age. However, for a subgroup of children this fear persists or becomes even more intense. The need for assessing and addressing childhood dental fear at an early stage is underlined, to be able to identify children at risk for developing high dental fear and subsequently to prevent this development of fear. However, the present study was conducted cross-sectional and longitudinal studies are needed to explore this specific development of dental fear in children. In conclusion, the CFSS-DS seems to be an adequate instrument for assessing dental fear in children and operates the same in the Netherlands as it does in other countries. By using this questionnaire, dentists will be able to distinguish children in need of extra attention and subsequently select the most appropriate treatment approach for these children, or decide to refer the child to a centre for special dental care.
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