Dental fear in children: prevalence, etiology and risk factors

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CHAPTER 7.2

THE ROLE OF BEHAVIOURAL AND EMOTIONAL PROBLEMS
IN REDUCING CHILDREN'S HIGH DENTAL FEAR

Abstract

This study was undertaken to assess the role of emotional and behavioural problems, as measured by the Child Behaviour Checklist (CBCL), in a child's dental fear development. The parents of 178 children (85 girls) referred to the Centre for Special Dental Care were asked to complete the Dental Subscale of the Children's Fear Survey Schedule (CFSS-DS) on behalf of their child, after the child's treatment at the Centre had finished. The results showed that the children's level of fear has decreased substantially after treatment at the Centre (mean 39.1 vs. 31.5, t=8.09, p=.000), but was still relatively high in comparison with children from the general Dutch child population. Fear reduction was found in all subgroups of children, with and without other problems, indicating that a structured behavioural management approach can be sufficient in reducing children's dental fear to a more controllable level. However, it was suggested that fearful children with a more complex problematic nature, in particular with internalising problems such as withdrawal and somatic complaints, might still form a risk group in daily practice. Extra attention is still needed for these children.

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Introduction

Several theories on the acquisition of fears and phobias have been suggested. Rachman (1977) has proposed a three-pathway model of acquiring fear: directly through conditioning and indirectly via modelling or negative information from others. In dental research, numerous studies indeed have provided support for these pathways, in particular for the direct conditioning one (e.g., De Jongh, Muris, Ter Horst & Duyx, 1995; Liddell & Gosse, 1998; Locker, Shapiro & Liddell, 1996; Locker, Liddell, Dempster & Shapiro, 1999; Townend, Dimigen & Fung, 2000). Most of these studies have, however, been conducted retrospectively among adult patients, thus based on subjective and potentially biased reports. Child studies have resulted in more inconsistent results, and seem to indicate that Rachman’s pathways do not fully explain the acquisition of dental fear in children, despite later revisions such as the latent inhibition theory (Davey, 1989; Klingberg, Berggren, Carlsson & Norén, 1995a; Milgrom, Mancl, King & Weinstein, 1995; Murray, Liddell & Donohue, 1989). Most important, the conditioning approach does not seem to account for the fact that some children became highly fearful without negative experiences or information, while other children who did undergo invasive dental treatment did not develop dental fear. Also, repeatedly parents were not able to indicate a direct cause of their child’s high dental fear (Alwin, Murray & Britton 1991; Mejäre, 1989; Ten Berge, Veerkamp, Hoogstraten & Prins, 2001).

Evidence for an additional role of temperamental factors in this process has been provided in several studies (Alwin et al., 1991; Brown, Wright & McMurray, 1986; Klingberg et al., 1995a; Klingberg & Broberg, 1998; Liddell, 1990; Williams, Murray, Lund, Harkiss & DeFranco, 1985). General fearfulness, shyness and introversion have repeatedly been associated with dental fear in children. For example, fearful children are found to have more difficulties adapting to and coping with new or unknown situations or people. Some of these studies also reported attention problems to be related to dental fear in children (see also Kindt & Van Den Hout, 1999). A study among children referred to the Centre for Special Dental Care in Amsterdam because of high dental fear indicated that these children also suffer from other emotional and behavioural problems, such as thought and attention problems, and aggressive behaviour (Ten Berge, Veerkamp, Hoogstraten & Prins, 1999). In search for the most effective treatment method for fearful patients, treatment should therefore incorporate these different etiological and concomitant factors. That is, other problems may complicate dental treatment, which subsequently could have a less positive effect on children’s fear development than in cases of simple dental fear or phobia. Thus, for children suffering from mood or conduct disorders a behaviour-based treatment program at a Centre for Special Dental Care may not suffice, these children may be in need of additional
psychological treatment. Studies among adult fearful patients indeed have indicated that individuals with other psychopathological problems or anxieties may respond less favourable to an exposure-based, behavioural treatment program (e.g., Aartman, 2000; Kleinhauz, Eli, Baht & Shamay, 1992; Makkes, Schuurs, Thoden van Velzen, Duivenvoorden & Verhage, 1987). For example, Weiner & Sheehan (1990) proposed an endogenous (internal) and an exogenous (external) classification of phobic adult patients. It was suggested that the former might respond best to drug treatments while the latter may benefit more from behaviour-based therapy or treatment. Since no studies have been conducted on the potential prognostic role of other emotional or behavioural problems in children fear’s development, the present study was undertaken. Its aim was to examine the effect of treatment at the Centre for Special Dental Care in Amsterdam (SBT) on the children’s level of dental fear, and to assess the role of emotional and behavioural problems in this development. In addition, after treatment parents were interviewed about factors potentially responsible for changes in the children’s fear level.

Material and methods

Subjects
This study was conducted among 178 children (85 girls) referred to the Centre for Special Dental Care (SBT) in Amsterdam, because regular treatment by their family dentist had become impossible. At this Centre, treatment generally aims at enabling children to be treated by their family-dentist again by using behavioural management techniques, sometimes combined with pharmacological agents such as nitrous oxide or propofol. This behavioural management approach is highly structured, conducted by trained dentists. Behavioural management techniques aim at behaviour modification by stepwise learning, (gradual) exposure and systematic desensitisation. Treatment takes place in absence of the child’s parents, to exclude potential parental modelling influences and to allow children forming their own experiences.

At referral to the Centre, parents complete the Dutch parent’s version of the Dental Subscale of the Children’s Fear Survey Schedule (CFSS-DS; Cuthbert & Melamed, 1982) and of the Child Behaviour Checklist (CBCL; Achenbach, 1991), on behalf of their child. After treatment, this version of the CFSS-DS was again sent to the parents of 309 children. The parents of 223 children (response rate 72.2%) completed and returned the CFSS-DS, of which 21 had to be excluded because of other problems such as behavioural or conduct disorders. For another 10 questionnaires more than 4 items were missing and 14 children were treated by means of intravenous sedation, so these also had to be excluded leaving 178 questionnaires for analysis. In addition, to gain information of factors responsible for
potential changes in children’s fear level, interviews were held by telephone with part of the parents (n=86). All parents were well informed on the purpose of the study and all signed a consent form. The mean age of the children at time of their referral to the Centre was 6.5 years (range 4-14 years). The mean time period between pre- and post-treatment assessment was 23.6 months (range 6-42, SD 8.6). No significant difference in pre-treatment fear level was found between respondents (n=223) and non-respondents (n=86) (mean 39.0 versus 39.3, p>.05).

Measures

CFSS-DS
The CFSS-DS is a questionnaire developed to assess dental fear in children (Cuthbert & Melamed, 1982). It consists of 15 items related to different aspects of dental treatment, to be answered on a 5-point scale from 1) “not afraid at all” to 5) “very afraid”. Total scores thus range from 15 to 75. Since the younger children were unable to complete the questionnaire themselves and to enable comparisons between age groups, in the present study the parents’ version of the CFSS-DS was used. Research has indicated parents to be well able to assess their child’s level of dental fear, and the scale was found to be reliable and valid (Klingberg, 1994; Klingberg, Berggren & Norén, 1994; Klingberg, Vannas Löfqvist & Hwang, 1995b; Milgrom, Jie, Yang & Tay, 1994; Ten Berge, Hoogstraten, Veerkamp & Prins, 1998). Cut-off scores for high dental fear have been set at scores between 38 and 42 (Chellappah, Vignesha, Milgrom & Lo, 1990; Klingberg, 1994; Milgrom et al., 1994). A previous study among a large, representative sample of Dutch children provided two different cut-off scores: scores of 39 and higher represent high dental fear in children likely to cause problems during treatment (“clinical range”), and in addition, scores between 32 and 38 represent a so-called “borderline range” (Ten Berge, Veerkamp, Hoogstraten & Prins, in press-b). Children scoring in this “borderline range” may be fairly fearful but their behaviour during and perception of treatment may depend on circumstances or the child’s temperament, or they may be at risk of developing high dental fear. Children scoring below 32 essentially are seen as non-fearful or low fearful, and in general, treatment should not be interfered with (“non-clinical range”).

CBCL
The CBCL is a questionnaire developed to assess emotional and behavioural problems in children, for a period of 6 months prior to the completion of the questionnaire. The CBCL is divided into ‘competence’ and ‘problem’ scales. Since the ‘competence’ scales have little relevance for the investigation of different types of problem behaviour in children, in this study only the ‘problem’ scales were used. These problem scales consist of 118 items, which
are divided over 9 problem scales: ‘withdrawal’ (9 items), ‘somatic complaints’ (9 items), ‘fear/depression’ (14 items), ‘social problems’ (8 items), ‘thought problems’ (7 items), ‘attention problems’ (11 items), ‘delinquency’ (13 items), ‘aggression’ (20 items) and ‘sex problems’ (6 items). The other items, not included in one of the 9 subscales, are classified as ‘other problems’ (11 items). These items do not form a separate scale but are included in the calculation of a “total problems” score. Each item can be scored 0 (‘not true’), 1 (‘somewhat or sometimes true’) or 2 (‘very true’); all items are summed to create an overall score. Scores on all subscales as well as a total problem score were obtained. In addition, scores for two broadband subscales, ‘internalising’ and ‘externalising’, were calculated by summing the relevant items. The ‘internalising’ scale consists of the items of the ‘withdrawal’, ‘somatic complaints’ and ‘fear/depression’ subscales and is related to internal problem behaviour. The ‘externalising’ scale consists of the items of the ‘delinquency’ and ‘aggression’ subscales and is related to external problem behaviour. Again, scores on all scales were classified as ‘non-clinical’, ‘borderline’ or ‘clinical’ according to cut-off scores suggested by Achenbach (Achenbach, 1991; Verhulst, Van Der Ende & Koot, 1996). The questionnaires were scored by computer, using the Dutch version of the CBCL-manual.

Interview

Interviews were held with the parents of 86 children (46 girls), by telephone. The aim of this interview was to retrospectively identify factors responsible for potential changes in children’s level of dental fear. Therefore, the parents were asked whether their child’s level of dental fear had changed in the course of treatment at the Centre, and if so, to subsequently indicate the factors responsible for this change.

Data analysis

Total scores were calculated for the CFSS-DS pre- and post-treatment scores and for all CBCL-scales. To assess differences in pre- and post treatment CFSS-DS level, paired t-tests were performed for the total group of children, as well as for children scoring in the different cut-off ranges separately. Analyses of variance were performed to assess differences in pre- and post-treatment CFSS-DS score for high- and low CBCL-scorers separately (borderline and clinical versus non-clinical scores). To examine the role of the CBCL scales in potential fear reduction, regression analysis was performed with CFSS-DS post-treatment score as dependent variable and CFSS-DS pre-treatment score (method: enter) and the CBCL scales, the child’s age and time period between pre- and post-treatment assessment (method: stepwise) as independent variables, for boys and girls separately.
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Results

CFSS-DS

After treatment at the Centre, a significant reduction in mean CFSS-DS score was found for the total group (n=178: pre 39.1 vs. post 31.5, t=8.09, p=.000). No significant gender differences were found in pre- or in post-treatment CFSS-DS scores (p>.05). Table 1 shows the percentages of children scoring in the severity ranges according to CFSS-DS cut-off scores, and their subsequent mean CFSS-DS scores before and after treatment at the Centre. Also, percentages of children scoring in the cut-off ranges after treatment are shown.

Table 1. Percentages of children scoring in the severity ranges according to cut-off scores, and mean CFSS-DS scores at pre- and post-treatment assessment at the Centre (n=178).

<table>
<thead>
<tr>
<th></th>
<th>% (n)</th>
<th></th>
<th>mean CFSS-DS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>pre</td>
<td>post</td>
<td>pre</td>
</tr>
<tr>
<td>low</td>
<td>30.3 (54)</td>
<td>57.3 (102)</td>
<td>24.9</td>
</tr>
<tr>
<td>borderline</td>
<td>17.4 (31)</td>
<td>19.1 (34)</td>
<td>35.6 *</td>
</tr>
<tr>
<td>high</td>
<td>52.5 (93)</td>
<td>23.6 (42)</td>
<td>48.3 **</td>
</tr>
</tbody>
</table>

*p <.05, ** p <.01

For the total group, a significant but moderate correlation between CFSS-DS pre-treatment and post-treatment score was found (r=.37, p=.000).

CBCL

Although boys overall scored somewhat higher than girls on the CBCL-scales, these differences did not reach significance (p>.05). A substantial part of the children were found to have emotional and/or behavioural problems: 38% of the children scored in the borderline or clinical range on “total problems”, 32% on “internalising” and 30% on “externalising”.

Fear reduction and CBCL scores

Table 2 shows the mean pre- and post-treatment scores for children with high versus low CBCL scales (borderline and clinical versus non-clinical). High CBCL-scorers showed a relatively high pre-treatment CFSS-DS level compared with low CBCL scores (p<.05). Also, a higher post-treatment fear level was found for high internalisers compared with low internalisers (p<.05). An analysis of covariance with pre-treatment CFSS-DS score included as covariate, however, showed no significant differences in post-treatment CFSS-DS score between high- and low CBCL scorers (p>.05).
Table 2. Mean pre- and post-treatment CFSS-DS scores according to severity of
CBCL problems (n=165).

<table>
<thead>
<tr>
<th></th>
<th>borderline/clinical</th>
<th>non-clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>pre</td>
<td>post</td>
</tr>
<tr>
<td>internalising</td>
<td>45.1³</td>
<td>34.0²</td>
</tr>
<tr>
<td>externalising</td>
<td>42.5³</td>
<td>33.6</td>
</tr>
<tr>
<td>total problems</td>
<td>42.5³</td>
<td>32.6</td>
</tr>
</tbody>
</table>

* significant difference with non-clinical group pre-treatment score (ANOVA)
* significant difference with non-clinical group post-treatment score (ANOVA)

Regression analysis using the scores of the total group revealed no significant contribution of
the CBCL-scales, the child’s age and time period between pre- and post treatment
assessment to the CFSS-DS post-treatment score, besides the CFSS-DS pre-treatment score
(Table 3).

Table 3. Stepwise regression analysis (post-treatment CFSS-DS scores).

<table>
<thead>
<tr>
<th>Variables in equation</th>
<th>Beta</th>
<th>t value</th>
<th>sign.</th>
<th>R² (cum.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFSS-DS (pre-treatment)</td>
<td>.387</td>
<td>5.35</td>
<td>.000</td>
<td>.150</td>
</tr>
<tr>
<td>Boys:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFSS-DS (pre-treatment)</td>
<td>.253</td>
<td>2.38</td>
<td>.020</td>
<td>.186</td>
</tr>
<tr>
<td>age</td>
<td>- .356</td>
<td>-3.53</td>
<td>.001</td>
<td>.254</td>
</tr>
<tr>
<td>withdrawal (CBCL)</td>
<td>.271</td>
<td>2.52</td>
<td>.014</td>
<td>.308</td>
</tr>
<tr>
<td>Girls:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFSS-DS (pre-treatment)</td>
<td>.344</td>
<td>3.22</td>
<td>.002</td>
<td>.118</td>
</tr>
</tbody>
</table>

For boys, regression analysis showed CFSS-DS pre-treatment score, age and the CBCL scale
"withdrawal" to be significant predictors of post-treatment CFSS-DS score (Table 3).
However, this CBCL scale only contributed 6% of the variance. For girls, none of the CBCL-
scales were included in the equation; only pre-treatment CFSS-DS score proved to be
significant.

Interviews
Almost all parents (87%, n=75) reported their child's level of fear to have decreased after treatment; eight parents (9%) indicated no change, while three parents (4%) said they did not know. Most of the parents (84%) reporting a decrease in their child's fear indicated the treatment approach at the Centre to be the underlying cause of their child's lower level of fear. Most often, particularly taking the time and providing clear instructions and structure were thought to have had a positive effect on their child's dental fear. Also, some of the parents mentioned that being empathetic though determined towards the child to have been important. Besides this structured treatment approach some parents indicated an internal change in the child to have caused the decline in dental fear such as growing older, improved coping abilities and an overall more positive emotional status (8%). Also, parents' own influence was reported to have stimulated the child. Some parents indicated that they were better able to guide their child, to be less fearful themselves and to have more confidence in dentists in general (3%). Finally, 5% of the parents were not able to indicate a specific cause of the decline in their child's fear.

Discussion
The present study has shown a significant reduction in the children's level of dental fear after treatment at the Centre. This mean level of dental fear after treatment, however, still remains relatively high in comparison with children from the general Dutch child population (Ten Berge et al., in press-b). Moreover, part of the children score in the borderline range or above, indicating that a risk of interference with treatment might still exist. These children still suffer some degree of fear, but may have learned different, more effective ways of coping with dental treatment, resulting in a more controllable level of dental fear. Although a substantial part of the children in this study were found to have other emotional and behavioural problems, fear reduction seems to have taken place mostly independent of the presence of these problems. Only for boys, emotional problems (i.e., withdrawal) were found related to their dental fear development. These problems, however, only explained a small percentage of the variance implicating that this dental fear might essentially be seen and treated as a simple, isolated problem. That is, the fact that the children's dental fear did decrease independent of their other problems might indicate that a management approach based on gradual exposure and systematic desensitisation does suffice to reduce this fear to a more controllable level for most children. In other words, the importance of counter conditioning is stressed in treating high dental fear in children, regardless of its origins. Even if a child's dental fear is part of or co-exists with a more complex problematic nature or general fearfulness, it seems that the child can be taught more adequate coping strategies to deal with the situation. The importance of this management approach and the dentists' role
is supported by both the present interviews and by previous research (Holst & Crossner, 1984; Holst & Ek, 1988; Ten Berge, Veerkamp & Hoogstraten, 1999; Varpio & Wellfelt, 1991). For example, studies have indicated that the patients’ subjective experience of dental treatment may be more important in the acquisition of dental fear than painful or invasive dental procedures actually performed during treatment (Ten Berge, Veerkamp & Hoogstraten, in press-a; Townend et al., 2000). It seems that the dentists’ approach may not only play an important role in reducing high dental fear but might also be involved in the acquisition of this fear.

Although all subgroups showed a significant fear reduction, an interesting trend in fear development should be noted. The fear level of children with other problems was found to be significantly higher before treatment than that of children without these problems, and remained somewhat higher after treatment for children with problems of an internalising nature than for children without these problems. This might indicate that treatment at the Centre generally may have been successful in reducing the children’s dental fear, but that children with more complex problems may still form a risk group for whom extra attention remains important. These children may be more susceptible to acquiring fear and may stay at risk in the long run. For these children obviously subsequent dental visits are very important in their future fear development. The positive experience of children with dental treatment at the Centre needs to be continued to reinforce children’s less fearful perception of the dental situation. Extra care is therefore needed when referring children back to a family dentist, also taking into account the children’s alleviated but still relatively high fear level after treatment. Moreover, it may even be advisable to re-assess the child’s level of fear before this intended referral and in cases of high fear to extend treatment at the Centre. Furthermore, also more attention may be needed at original referral to the Centre. That is, the fact that part of the children were rated by their parents as low fearful at referral implies that this referral may have been based on complicated dental problems or conduct disorders, but of course also dentist-related factors may have been involved (Weerheijm, Veerkamp, Groen & Zwarts, 1999).

In conclusion, treatment at the Centre did reduce children’s dental fear to a more controllable level for most children. Children seem to have learned more adequate ways of coping with dental treatment by providing them with a structured setting and a behaviour-based management approach (Ten Berge et al., 1999b). It should however be noted that children with a more complex problematic nature, particularly with internalising problems, might still form a risk group. These emotional problems in children should therefore be regarded as risk factors in the acquisition of high dental fear, but possibly also in maintaining this dental fear and the subsequent risk of interference, even after treatment at
the Centre. Interestingly, attention problems were not found to influence children’s fear development in the present study, while earlier studies have indicated that an “attentional bias” may be involved in the maintenance of fears in children (Kindt & Van den Hout, 1999). Other studies also reported a relation of child dental fear with attention problems and distractibility (Alwin et al., 1991; Liddell, 1990; Ten Berge et al., 1999). Operationalisation of this concept may underlie this discrepancy. That is, in the present study attention problems assessed by the CBCL for the most part seem to concern behavioural aspects such as impulsivity and clumsiness, while cognitive aspects are less incorporated. Future studies should therefore further examine the potential role of “attentional bias”, by using more cognitively oriented instruments. More research is also needed on the efficacy of specific treatment modes for different subgroups of children, so possibly an even greater fear reduction can be obtained after treatment. Finally, future research is needed to examine as to whether the obtained fear reduction can be maintained in the long run, also after dental treatment by a general practitioner is resumed.
References


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