Dental fear in children: prevalence, etiology and risk factors

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Chapter 10

Introduction
The main objective of this thesis was to provide more insight into the etiological process of dental fear in children. The psychometric and clinical value of the CFSS-DS (Dental Subscale of the Children’s Fear Survey Schedule) was first studied and the prevalence of dental fear in children in the Netherlands was reported. Hereafter, the role of several factors in children’s fear development was studied and the effects of treatment in a Centre for Special Dental Care were evaluated. The aim of the present chapter is to integrate and discuss the findings reported in the separate chapters of this thesis. Firstly, the main findings are summarised and subsequently their theoretical and practical implications will be discussed. Recommendations for future research are made at the end of this chapter.

Summary of main findings
Chapter 2 provided an overview of etiological theories and studies on factors associated with dental fear in children. Direct conditioning was most frequently indicated as an important etiological pathway although a distinction seems necessary between objective and subjective conditioning experiences. In several recent studies the latter was suggested to be more important than the former in the acquisition of dental fear. Support has also been provided for the modelling pathway, that is the influence of parental dental fear, although its supposed causality is unclear. Several personality factors have also been associated with dental fear in children (e.g., general fearfulness and negative emotionality).

In Chapter 3 the psychometric properties of the Dutch parent version CFSS-DS, the instrument for assessing childhood dental fear used in this thesis were examined. Parts 1 and 2 of this chapter aimed at assessing the reliability and the factor structure of this version of the questionnaire in two different study samples, i.e., a low fearful sample of children from the general population and a high fearful sample of children referred to a Centre for Special Dental Care. This factor structure was compared with that reported in an earlier Finnish study (Alvesalo, Murtopaan, Milgrom, Honkanen, Karjalainen & Tay, 1993). Factor analysis yielded highly comparable factor patterns, for both our study samples as well for the earlier study. In addition, the reliability of this Dutch version of the CFSS-DS proved to be high: Cronbach’s alpha was found to be 0.83 and 0.90. Part 3 of this chapter focused at the validity and clinical utility of the CFSS-DS, by comparing it to a clinical fear rating conducted by the dentist. Significant correlations between the two fear measures were found, providing support for the validity of the questionnaire. Its value for predicting behavioural management problems or interference with treatment was, however, found to be low. It was concluded that this Dutch parent version of the CFSS-DS adequately identifies dental fear in children and generally operates the same as it does in other countries.
The aim of Chapter 4 was to collect normative data using the Dutch parent version of the CFSS-DS and to report on the prevalence of high dental fear among Dutch children. For this purpose, data were collected among a large, representative sample of the Dutch child population. The results show that a substantial part of the Dutch child population (14%) suffers from some degree of dental fear, comparable to reports in other West-European countries (Bedi, Sutcliffe, Donnan & McConnachie, 1992; Klingberg, Berggren & Norén, 1994). More specifically, 6% was found to be extremely fearful and another 8% fairly fearful ('at risk'). The cut-off score for high dental fear was set at a CFSS-DS score of 39 (range 15-75) and in addition, a new aspect was introduced into the assessment of child dental fear. That is, a borderline range was set at scores between 32 and 38. Children scoring in this range are considered to be fairly fearful, or at risk of developing high dental fear. Behaviour of these children during treatment and their future fear development may depend on circumstances or personality or temperamental factors. This latter 'at risk' group was therefore identified as a highly important group for the analysis and prevention of dental fear; these 'borderline' scores seem to have a signalising function.

In Chapter 5 parents of highly fearful children were interviewed about their beliefs on the origins of their child's dental fear. In addition, parents of low fearful children were interviewed about their beliefs on the reasons for their child not becoming fearful. The results were in line with earlier reports. Most often parents attributed their child's fear to previous negative dental (50%) or medical (19%) experiences, or temperamental factors (16%). A small proportion of parents (5%) also mentioned social factors such as their own dental fear to have been important. The results provided support for Rachman's pathways theory (1977) as well as additional evidence for a constitutional or temperamental factor. The fact that in this study parental interviews were used may have underestimated the proportion of social factors reported.

The next chapters focused more specifically on the relation of those factors particularly associated with childhood dental fear. Chapter 6 assessed the role of parents in their child's fear development by studying the relation between child dental fear, parental dental fear and child rearing behaviour. The results showed no significant differences in parental dental fear and few differences in child rearing behaviour between groups of parents of high-and of low fearful children. Parental dental fear, however, was found related to their child rearing behaviour and seemed to indicate a certain level of ambivalence in fearful parents. Fearful parents were found to behave more overprotective as well as more autonomy promoting towards their child than low fearful parents.

Chapter 7 focused on the role of temperamental factors, in this thesis operationalised as behavioural and emotional problems of the child. In part 1 of this chapter an inventory of
these problems was made, by comparing reported problems of children referred to a Centre for Special Dental Care with those of a Dutch norm group. It was found that fearful children displayed more emotional and behavioural problems than children from the general Dutch child population, and that these problems were heterogeneous. That is, not only emotional problems such as “somatic complaints” or “withdrawal” were found, but also behavioural problems such as “aggression”. A relatively high percentage of attention problems were also found. For some of the children their fear may be part of a more complex problematic nature; it is also conceivable, however, that for others these problems may have been interpreted as dental fear by the referring dentist. In Part 2 of this chapter, the role of these emotional and behavioural problems in children’s further fear development has been examined, by reassessing the child’s level of dental fear after treatment at the Centre. The results showed a significant fear reduction for most children, although it should be noted that the general level of dental fear after treatment was still relatively high in comparison with the general child population. In addition, the mean fear level of children showing other problems was significantly higher than that of children without such problems, indicating that these children may still form a risk group despite a general reduction in their fear level. It was concluded that the behaviour-based treatment approach at the Centre reduced high dental fear to a more manageable or controllable level, regardless of the presence of other problems.

Chapter 8 aimed to investigate the relative contribution of direct conditioning experiences in the acquisition of dental fear in children, in the context of regular attendance. The results showed actual dental procedures to play a marginal role in dental fear acquisition. Only the number of extractions explained a small part of the variance (CFSS-DS) while no relation was found with the number of fillings or curative treatments. Behavioural management problems were found during check-up visits as well as during curative treatment sessions, indicating that these also are not only related to invasive or painful procedures. Clinical support for the latent inhibition hypothesis was provided: low fearful children had experienced more check-up visits preceding to their first curative treatment session than high fearful children did.

In Chapter 9 treatment at the Centre for Special Dental Care in Amsterdam was evaluated, and more specifically, the relation between the child’s dental fear and the dentists’ behaviour was examined. The results showed that dentists used more directive strategies when treating high fearful children than during treatment of low fearful children. Furthermore, the children’s dental fear was found to have decreased subsequent to this treatment approach, implying that this management strategy had a positive effect on highly fearful children.
General discussion

A multifactorial model of dental fear acquisition

Placing the results in a broader perspective, a multifactorial and interactive model might be deduced. That is, none of the factors studied in this thesis proved to be very strong etiological factors per se, or to be significant predictors of fearful children's further fear development. The influence of parents was found to be marginal (chapters 6 and 8) and the prognostic role of emotional and behavioural problems in children's fear development also proved to be small (chapter 7). The number of experienced dental procedures was, furthermore, found to play only a minor etiological role (chapter 8). These results thus provide evidence for a weakness of supposed etiological factors based on straightforward conditioning and seem to indicate that an interaction of multiple pathways may underlie a child's dental fear. However, the results may also indicate that other, treatment-related, factors may be involved and seem to stress the importance of the treatment approach. That is, support for the latent inhibition mechanism was provided (chapter 8) and a structured behavioural management approach was found to have a positive effect on children's dental fear development (chapters 7 and 9). Although the nature of these latter studies was explorative and only examined the effect of one treatment mode (i.e., behavioural management) in high fearful samples, we believe that, however tentative, some clinically important hypotheses can be deduced. Implementation of behavioural strategies such as gradual exposure or systematic desensitisation seems helpful in reducing children's high dental fear, while implementation of latent inhibition principles in a child's treatment course may help preventing the acquisition of this fear. In this view, factors such as internalising problems, experienced extractions and parental dental fear may need to be considered as risk factors contributing to the conditioning process or predisposing a child to a heightened risk for developing dental fear, though not responsible for the onset of this fear. Dental procedures per se do not seem to cause dental fear but the way these procedures or stimuli are presented may be more important.

This notion is supported by the findings from the parental interviews (chapter 5), in which parents indicated the setting or sequence of procedures to have been decisive in their child's onset of high dental fear. Recent studies also have provided support for this notion. Dental health was found to be only weakly related to child dental fear while other factors such as perceived dentists' empathy were indicated to be more important (Bergius, Berggren, Bogdanov & Hakeberg, 1997; Klingberg, Berggren, Carlsson & Norén, 1995; Townend, Dimigen & Fung, 2000). In our model (subjective) direct conditioning may also be seen as the predominant factor in dental fear development although some important distinctions need to be pointed out. No support for a simple, straightforward cause-and-effect conditioning
relation was found. The conditioning pathway may be mediated by the aversiveness of the stimuli (e.g., extractions versus fillings) as well as by children’s ability to cope, which in turn may be influenced by other factors (e.g., latent inhibition). With respect to terminology used in chapter 2 (Townend et al., 2000), the latter seems to partly determine subjective conditioning experiences (i.e., emotional nature of visits) while the former refers to objective conditioning (procedures experienced). This relative importance of and discrepancy between subjective and objective experiences has also been reported on in studies on other areas (Rietveld & Prins, 1998). These findings support the multifactorial model as proposed in chapter 2, although the caveats discussed above need to be incorporated (see Figure 1). This seems to bring us closer to a definite model of child dental fear, possibly generating preventive implications, although more research is needed to further unravel the interactive etiological process of dental fear.

**Figure 1.** Adjusted nomological model of factors contributing to dental fear in children.

In this model, (subjective) direct conditioning factors have been disentangled from the other factors, to emphasise the potential importance of treatment approach in the development of dental fear in children. Also, a distinction between dispositional and situational factors is made in this model, which may provide a basis for breaking through the vicious circle of dental fear (see p. 156-157). Dispositional coping *style* and more situational coping *skills* also have been distinguished, given that the latter may be subject to continuous change and can be manipulated by other factors (Litt, 1996).
Nature of the studies

A limitation of the present studies may be their overall cross-sectional, correlational nature. Not being based on direct empirical evidence with respect to their causality, our conclusions are partly deductive and therefore hypothetical. Ideally, a longitudinal study following children from their first dental experiences into early adolescence would be needed to study all the underlying etiological processes of dental fear. This would, however, be difficult given the interactive nature of this process. It may be impossible gathering relevant information during the course of a child's development including all the etiological pathways. To cover the most important aspects of fear development, our studies were conducted partly retrospectively by studying the origins of dental fear objectively (dental records) as well as subjectively (interviews), and partly on an explorative basis by focusing on potential modification of children's dental fear through continuous exposure to dental treatment. This method enabled us to also study the conditioning process from a different perspective, and provided additional information on the relative importance of counter-conditioning of dental fear by gradual exposure and systematic desensitisation.

Age and developmental aspects

In further unravelling the etiological process of childhood dental fear additional information on some aspects of a child’s development may be helpful. In the present thesis no support for an age-related decrease in dental fear was found (chapter 4), but the nature of dental fear might change with increasing age. This would have clinical implications since it is conceivable that more detailed distinctions are necessary between age groups. Cognitive and coping abilities, which increase with age, can influence the etiological process. In younger children primarily separation anxieties, lack of control or behavioural management problems may underlie their level of dental fear or changes in level of fear. For older children, developing cognitive abilities in combination with increased fear of bodily injury or physical danger might mediate their perception of dental treatment. In terms of our proposed model, the path from dental experience to dental fear may become more complicated with increasing age, with more factors influencing the final appraisal of experiences. In an explorative study, Liddell, Rabinowitz and Peterson (1997) reported ‘the inclination of children to perceive dental stimuli and their own responses as being more often negative than positive was accelerated with age’ (p. 628). In older children cognitive biases (e.g., ‘attentional bias’; Kindt & Van Den Hout, 1999) may become involved in influencing or reinforcing fear development. The shift from behavioural to cognitive aspects may thus affect associated conditioning mechanisms. Latent inhibition is particularly important in younger children and although regular attendance remains important throughout life, the importance of this process may be
modified with increasing child age. For example, Poulton, Thomson, Davies, Kruger, Brown and Silva (1997) indicated that dental health (DMFT) at 15 was positively related to dental fear at 18 years of age whilst dental health at 5 years was not. Moreover, caries severity was inversely related to this fear. Conditioning should be seen as a long-term, continuous process, also depending on the nature of treatment provided during this period.

Assessment of dental fear (CFSS-DS)

The fact that the line between fearful and non-fearful patients is not always clear-cut does indicate that a more sophisticated and individual assessment method is needed. The present study introduced a new aspect in the study and assessment of child dental fear: a “borderline” range of dental fear. Children scoring in this range were identified as an important risk group in daily practice, based on the assumption that intervention may prevent the development of high dental fear, or the reinforcement of existing fear. This was illustrated in chapter 7: a shift in fear scores was observed after effective intervention, from children scoring in the borderline range to the non-clinical range, and from the clinical to the borderline range. This latter group of children still is ‘at risk’. Although their dental fear has been reduced to a more controllable level, this fear level needs to be stabilised or reduced further considering it is still relatively high in comparison with the general child population. By developing this classification profile the CFSS-DS can, besides for research purposes, also serve as an individual tool for selecting appropriate treatment strategies in daily practice. Information is provided on severity of fear as well as on most fear-evoking aspects of the situation on an individual basis. The CFSS-DS can also be used as a tool for referral procedures to paediatric dentists or Centres for Special Dental Care, possibly in combination with additional instruments. The results indicated that this instrument is best suited for identifying fearful children, while its predictive value with respect to child behaviour during treatment is low. The structure of the CFSS-DS captures a range of associated aspects involving more or other aspects than state anxiety or behaviour; this questionnaire is assumed to measure a stable, situation-specific fear. For predictive purposes an adjusted version of this instrument also incorporating behavioural and coping aspects, providing insight into probable behavioural patterns, would be needed.

Given the age range of the children in our studies, the parent version of the CFSS-DS was used to measure children’s dental fear. Dependence on this instrument may entail potential disadvantages that need to be discussed. It might be argued that reports may be influenced by the parents’ own perception of dental treatment, or that child-parent agreement would be low for such a subjective phenomenon as dental fear. It has, however, been argued that agreement is enhanced in situations involving more parental contact and presence (Beasley
& Kearney, 1996). This clearly applies to the assessment of dental fear in our studies. All the parents participating were highly involved given that they all accompanied their child during dental visits and thus were generally aware of their child's behaviour and attitudes before, during and after each visit. The weak correlation found between child- and parental dental fear, furthermore, contradicts the assumption that parents' reports may be influenced by their own fears. As outlined in the general introduction, we consider parental reports to be the best available approach to a “gold standard”, given that children themselves often are too young to reflect on or describe their feelings and that dentists’ reports largely rely on displayed behaviour during treatment.

Practical implications

Risk groups

Several risk groups can be distinguished within the child population in daily practice. The distinction between dental fear and behavioural management problems is important as this ‘risk’ may be based on different phenomena. Behavioural management problems may often be perceived as dental fear while they essentially may be a manifestation of a child’s externalising temperament. In fact, some of the children referred to the Centre for Special Dental Care were indeed rated as non-fearful by their parents. This group of children could essentially have problems controlling their behaviour in general and may be in pain. Possibly, they are more in need of clear structure and guidance than of a specific fear-reducing approach such as gradual exposure. These children may be less sensitive and better able to cope with external threats or invasive situations in comparison with fearful children and if so, need to be approached in a more directive way. Behavioural management problems may be seen as an expression of pain or state anxiety related to dental variables, while dental fear possibly covers a wider range of aspects (Klingberg, Sillén & Norén, 1999). These behavioural management problems are nonetheless of importance in daily practice, given that they cause friction or interference with treatment. This could elicit a negative reaction from the dentist, in turn causing negative or even traumatic recollections in the child and leading to the onset of a vicious circle of dental fear. In this view, behavioural management problems may also be seen as a precursor of dental fear, not only as a consequence.

A highly important group at risk of developing dental fear is the group of children suffering from internalising problems (Klingberg & Broberg, 1998). As discussed previously, these children are more susceptible to acquiring fear, due to their introvert, shy or withdrawn nature. They have difficulties approaching strange or unfamiliar people and situations, and for them, the dental situation can be a highly threatening one. Particularly for
Chapter 10

these children extra care and attention is therefore required. Gradually exposing them to
treatment based on a stepwise learning program also incorporating latent inhibition
principles, may offer these children the best setting to protect them from traumatic
experiences. It seems important not to rush these children into treatment, but to let them
gradually become acquainted with the dental situation. Bearing in mind the results of
chapter 7, these children may have a long-term risk, implying that this care should be
continuous and might need to be extended after treatment at a Centre for Special Dental
Care.

Finally, children from highly fearful parents require some special attention. In our studies,
a comparison between two selective groups with prior dental experience showed no relation
between child dental fear and parental dental fear or child-rearing behaviour (chapter 6). In
chapter 8, however, a significant though somewhat weak relationship between child- and
parental dental fear was found. Parental dental fear may be involved in a mediating way: in
children indirect learning experiences may be quickly overridden by new, more direct
learning experiences. A remark with respect to the assessed child rearing behaviour also
needs to be made. It may be argued that it is too general a concept in comparison with the
specificity of the fear studied. Another study among young children with no previous dental
experience, however, did report a relationship with such general child rearing (Venham,
Murray & Gaulin-Kremer, 1979). This implies that the lack of association in our study may
essentially stem from a difference in dental experiences rather than from conceptualisation
issues (see Winer, 1982).

Treatment of dental fear: breaking through the vicious circle

From a treatment point of view several points of breaking through the vicious circle of dental
fear can be discerned. The focus of intervention needs to be directed at the situational factors,
given that several of the contributing factors are dispositional and thus cannot be
manipulated (see Figure 1). This means that the management approach and parental
guidance are of special interest for modifying coping skills and level of fear. The dentist has
to create the optimal situation for treatment acceptance, by precluding as many intrusive
external stimuli as possible, by keeping the present stimuli or influences constant and by
presenting treatment according to exposure principles.

At this point some important clinical implications can be outlined, although for a general
discussion of behavioural strategies in treating children the reader is referred to (paediatric)
textbooks (Advokaat, Berendsen, Van Grunsven & Hoff, 1987; Milgrom, Weinstein & Getz,
1995). Regular attendance from an early age on in the absence of invasive procedures may
inoculate children against the acquisition of dental fear. It seems important providing
children with familiarisation visits, to enable them to experience neutral or even positive visits providing them with a more stable basis and perception of dental treatment. In cases of acute, extensive dental health problems it may, however, be advisable to first restore the child’s teeth under general anaesthesia and only then start a familiarisation procedure. In this context the importance of regular attendance is an important prerequisite; experiencing restorative treatment in the context of regular attendance may provide the best climate, while irregular attendance may negatively affect the child’s ability to cope (Murray, Liddell & Donohue, 1989). As suggested by Poulton et al. (1997), ‘consistent with exposure principles, dental patients should be encouraged to cope with mild levels of discomfort for longer periods of time’, whereas ‘shorter duration, single-surface treatment may actually sensitise an already mildly anxious patient by not allowing sufficient time for habituation to occur’ (p. 332). Finally, the management approach should be adjusted to a child’s developmental stage, given that the nature of fears and coping abilities might vary with increasing age.

Referral procedures
The importance of adequate referral procedures and the appropriate use of screening instruments should be stressed. Adequate instruments are needed not only to identify the nature of dental fear and of concomitant problems for selection of the most effective treatment approach, but also for a better referral procedure from dentist to a Centre for Special Dental Care and vice versa. Some of the children referred to the Centre in Amsterdam were rated as low fearful by their parents, implying that other underlying factors were involved in the referral process. Besides complicated dental problems or behavioural management problems, dentist-related factors may have played a role in the original reason for referral. The use of more adequate screening procedures may prevent inappropriate referrals, which would have a positive effect on the length of the waiting lists for the Centres. Even more important is the referral back to a general practitioner, given the desirability of reinforcement of the obtained fear reduction, or of a further reduction of this fear. It may be advisable to re-assess children’s dental fear before this referral back to a regular dentist in order to minimise chances of this referral occurring too early. As mentioned above, more adequate screening at original referral to the Centre will result in shorter waiting lists and thus in more room for this re-assessment, as well as for a potential extension of treatment at the Centre if needed. Another recommendation would be to refer children to a paediatric dentist, trained in behavioural management techniques and experienced in treating fearful children, as a standard procedure, to secure and optimise a stable fear reduction.
Recommendations for future research

Although important indications were found, more research is needed to further draw up a definite model of dental fear in children. Further research on potential modification of situational factors is needed, to determine their effect on the prevention and treatment of high dental fear, and on children's developing coping skills. This does refer to specific treatment strategies as well as to the interference with dentists' behaviour. For example, the most effective way to include parents in the dental situation should be further examined. With respect to dispositional factors, research has to focus on the most effective treatment mode for subgroups of fearful children, to possibly accomplish even more fear reduction after treatment. Protocols for treatment of subgroups should be developed, corresponding to the nature of concomitant problems as well as to predominant behavioural or cognitive components. An issue that may need to further studied, for example, is the potential role of "attentional bias". Furthermore, research has to follow-up on children referred back to a general practitioner after treatment at a Centre to examine whether the obtained fear reduction is stable. Factors influencing this future fear development have to be identified, for children suffering from high dental fear as well as for children 'at risk'. With respect to the development of more adequate referral procedures, in-depth interviews among general practitioners may provide more insight into processes and incidents underlying their decision for referral. On a practical level, the CFSS-DS may need to be revised to obtain an additional version that can be used as a predictive tool of children's behaviour during treatment.

Conclusion

A substantial proportion of the Dutch child population (14%) was found to suffer from some degree of dental fear. With respect to supposed etiological factors of this dental fear, no evidence for a direct, straightforward conditioning relation between dental fear and invasive dental procedures was found. The influence of parents and of temperamental characteristics was found to be small, indirectly implying that other factors may be more important. The results did provide support for the importance of behavioural management strategies such as gradual exposure and latent inhibition. An interactive and multifactorial model of childhood dental fear was therefore proposed in which (subjective) direct conditioning experiences were suggested as important. It should be kept in mind, however, that painful procedures per se were not found to be the cause of dental fear, but that the way these procedures are presented might be more important. The results seem to stress the importance of behaviour management strategies in treating highly fearful children.
References


Chapter 10


