General introduction and aims of the thesis
General introduction:

Paediatric Dentistry, treatment of (often young) children, deserves a special place in the dental profession. From both the preventive- and the operative points of view, young children have needs requiring special skills on the part of the dentist. When treating these children, dentists are often confronted with uncooperative behaviour. These dental behaviour management problems (DBMPs) are the most frequent reason for failures of dental treatment and referrals to a secondary dental care clinic. To successfully treat children and their DBMPs it is valuable for the dentist to know the causes of these problems. The main cause of DBMPs is obviously dental anxiety. Because of this anxiety caused by the dental treatment, or more broadly the entire dental situation, children frequently try to escape from the situation.

The central theme of this thesis is the interaction between dental anxiety and behaviour management problems. The thesis focuses on how parents, dentists, and different child characteristics influence the occurrence of dental anxiety and how these parameters relate to behaviour management problems in dental practice. These problems would not exist without the need for restorative dental treatment which, in children, is primarily the result of dental caries.

Dental caries

Affecting more than half of 5-year old Dutch children, dental caries is the most prevalent chronic childhood disease [Poorterman & Schuller, 2006]. Despite a substantial decline in the seventies and eighties of the last century [Kalsbeek et al., 1996], which was caused by the introduction of fluoride containing toothpaste, the caries prevalence in young children (toddlers and preschoolers) in the Netherlands has remained high [Kalsbeek, 1982; Kalsbeek et al., 1992; Boelens et al., 2001]. The mean number of decayed, missing and filled teeth (dmft) of Dutch 5-year old children is 2.9 [Kalsbeek et al., 2002; Poorterman & Schuller, 2006]. While 44% of these 5-year-olds have a caries free dentition, the remaining 56% of these children have on average 5.2 cavities per child [Kalsbeek et al., 2002; Poorterman & Schuller, 2006]. Because these dmft data were collected without the use of radiology, the actual number of dmft in these children is probably even larger [Poorterman et al., 2010].

The d component accounts for a major part of the dmft [Elfrink et al., 2006], which means that part of the dental decay of these children remains untreated. However, the majority of the Dutch dentists is convinced that the treatment of the young child’s dentition is necessary [van Dam & Bruers, 2003; Jensma & Veerkamp, 2008]. Despite this necessity to treat, a part of the dental decay remains untreated, which implies that there must be other reasons for not treating those children. One reason could be their uncooperativeness [Pine et al., 2004; McQuistan et al., 2006; Jensma & Veerkamp, 2008].

Particularly in young children, dental behaviour management problems are an important reason for failure of treatment. If dentists have a chance to do so, many of them prefer to refer those young children to a special paediatric dentist [McQuistan et al., 2006; Jensma &
There is no consensus regarding the reasons underlying a child’s uncooperative behaviour displayed at the dental practice. While parents tend to blame the previous dental treatment or the operating dentist, the dentist usually has a different opinion and tends to blame other factors, such as parental rearing style [Mejare et al., 1989; Klaassen et al., 2007]. Dental anxiety is the most important reason for the occurrence of behaviour management problems.

**Dental anxiety**

The terms “dental fear” and “dental anxiety” are often used interchangeably and synonymously in the literature, particularly in the field of child research. Although these concepts are interconnected, there are conceptual differences between them [Benjamins, 1995; Milgrom et al., 1995]. Traditionally, fear is differentiated from anxiety in that anxiety involves the anticipation of a specific focus or stimulus, while fear involves the reaction to such a stimulus. Since both result in comparable child behaviours the term dental anxiety is used to describe both in this thesis. Moreover, in the Dutch language, the difference between anxiety and fear is not as clear as it is in the English language.

In the Netherlands, the prevalence of child dental anxiety in 4 to 11-year-old children lies between 6 and 14% [ten Berge et al., 2002]. According to ten Berge, six percent of the children are highly anxious; another eight percent are at risk of becoming so. When dental anxiety persists into adulthood, it can lead to avoidance of dental care and dental treatment, and subsequent deterioration of oral health. Eventually, this may result in a vicious circle of avoidance, increasing dental problems and reinforcement of dental anxiety and avoidance behaviour [Berggren & Meyner, 1984; Schuller et al., 2003]. This avoidance can start in childhood when parents “protect” their child against dental anxiety by avoiding the dental situation. Also when faced with uncooperative child behaviour a dentist might decide to limit the discomfort by speeding up the treatment, with the risk of reduced quality and its associated negative consequences [Somani et al., 2010; Finucane, 2012].

The aetiology of dental anxiety is complex and multifactorial, including factors as painful experiences, parental anxiety, information by parents or siblings, and a child’s temperament or character [Klingberg et al., 1994; Rachman, 1994; Klingberg et al., 1995; ten Berge et al., 2002]. In children, dental anxiety results from anxiety of, not only pain or invasive procedures, but also separation from their parents, being confronted with unfamiliar people and surroundings, and the loss of control. The most cited theory for the acquisition of dental anxiety is the three pathway theory [Rachman, 1977]. In the first pathway, dental anxiety is acquired directly through classical conditioning. This means that a child’s negative or invasive experiences during a dental visit may cause a negative association with the dental situation. In the second pathway, dental anxiety is acquired indirectly through vicarious learning. This indirect pathway refers to negative information provided by close relatives and friends, or by internet or television. In the third pathway, children may acquire dental anxiety through modelling, for example, when children observe a friend or relative reacting anxiously to the
dental situation. Although Rachman’s pathways all have been supported by research, retrospective research often attributes the acquisition of dental anxiety to the first pathway, direct conditioning [Muris et al., 1997]. However, although the direct conditioning pathway seems the most plausible, research also suggests that objective dental experiences play a minor role in children’s anxiety acquisition, and that subjective dental experiences may be more decisive [Liddell, 1990; Alwin et al., 1991; Townend et al., 2000; ten Berge et al., 2002].

Because the three pathway theory does not totally explain the acquisition of dental anxiety, research has focused on additional factors in the aetiology of dental anxiety. For instance, there is reasonable evidence for the latent inhibition theory, whereby a history of positive or neutral dental experiences might serve as a defence against the development of intrusive memories of the experience, and subsequently against the acquisition of dental anxiety [Lubow, 1973; Davey, 1989; ten Berge et al., 2002]. Other aetiological factors related to the development of child dental anxiety include parental anxiety, and the child’s age and gender [de Jongh et al., 1995; Klingberg et al., 1995; Muris et al., 1997; Townend et al., 2000]. Because similar dental experiences do not lead to the same level of dental anxiety in all children, certain personality characteristics of the child, such as shyness or a tendency toward negative emotionality are additional factors in the acquisition of dental anxiety [Gustafsson et al., 2010; Krikken et al., 2010]. Dental anxiety might also be related to the coping ability of children [Marsac & Funk, 2008; Bernson et al., 2012].

The model developed by ten Berge in 2001 includes factors related to dental anxiety and includes situational and dispositional factors [ten Berge, 2001]. In this model, two types of situational factors are distinguished. The first are factors within the child’s environment, such as parent’s dental anxiety, dental history and parental rearing style. The second are situational factors that are influenced by the dental situation (Figure 1). The dispositional factors are factors that remain constant in time. The factors printed in bold are investigated in the chapters of this thesis.

**Dental behaviour management problems**

Although behaviour management problems are mainly a consequence of child dental anxiety, the literature sometimes considers these two entities as the same phenomenon. Despite their similarities, they are obviously not the same. While some children with high dental anxiety do not display behaviour management problems, some children with low dental anxiety disrupt the treatment more than the dentist can handle. Although it seems obvious that dental anxiety leads to uncooperative behaviour during dental treatment, the opposite might also be true: Uncooperative behaviour might also lead to dental anxiety. Children who behave uncooperatively may frustrate the dentist. If the dentist gets impatient or even angry, this influences the child’s subjective dental experience, which can in turn result in dental anxiety. The relation between dental anxiety and behaviour management problems is therefore not straightforward. Other factors besides dental anxiety, might therefore cause uncooperative behaviour. Behaviour management problems include a wide variety of adverse child
behaviours. Some children just show their distress by crying and screaming during the treatment. This can, of course, be frustrating for the dentist, but usually treatment can still be done without negative consequences for its quality. However, children might also display their distress physically e.g. by closing their mouth, moving around, kicking, hitting or even spitting, biting or running away.

The question is why these children display this behaviour. The basic reason will always involve some level of dental anxiety. If children were totally relaxed, they would not display uncooperative behaviour. They may actually be expressing their anxiety about an upcoming event they therefore try to avoid by acting uncooperatively. A young child will not always be able to express its feelings verbally; crying and moving is their way of communication. If this behaviour had some effect in the past, either in a dental situation or in another, it might be rewarded and installed in the dental situation by conditioning mainly of the parents. Some children have more externalizing behaviour, they are inclined to express their feelings verbally or with movements. Other children have a more internalizing character and do not express their feelings so clearly. Considering this theory, the parenting style of parents together with dental anxiety might play an important role in the aetiology of behaviour management problems in children during dental treatment.
Parenting style

Child rearing (or parenting) is described as the process of promoting and supporting the physical, emotional, social and intellectual development of a child from infancy to adulthood. Parenting refers to the aspects of raising a child aside from the biological relationship [Davies, 2000].

Developmental psychologist Diana Baumrind developed a typology composed of three parenting types, authoritative, authoritarian, and permissive [Baumrind, 1971]. These parenting styles were later expanded to four, including a neglectful style. These four styles of parenting involve combinations of acceptance and responsiveness on the one hand and demand and control on the other. Authoritative parenting emphasizes parental control within an ethos of warm, responsive parenting that explains reasons, values the child as an individual and aims to encourage the child towards independence. Authoritarian parenting is controlling, values obedience to set standards, favours punishment and is less warm than authoritative. Permissive parenting is where the parents lacks control, makes few demands on the child, but is warm. Neglecting parenting is neither controlling, permissive, nor warm [Baumrind, 1971].

The role of parenting in the child dental situation can be divided in two aspects. First, the situation at home. Parents decide for their children whether they eat healthy food, brush their teeth, and use fluoride toothpaste. As such, health related behaviours of children are influenced by parent's rearing style [Park & Walton-Moss, 2012]. As part of this, the occurrence of dental problems such as dental caries and the associated treatment need might be considered a direct result of this rearing process. Second, the behaviour the child displays during dental treatment might be a reflection of the way a child behaves and how it is raised at home. When asking dentists about the reasons for uncooperative behaviour in children during dental treatment, many of them will respond that parenting style might be one of the reasons [Mejare et al., 1989; Klaassen et al., 2007]. They believe that a permissive parenting style, that is a style that corresponds to behaviours of affection and responsiveness towards the child, without setting restrictions for appropriate behaviour, leads to children that exhibit behaviour management problems, as these children are not used to adapt to clear and strict rules.

Dental caries, dental anxiety and dental behaviour management problems

It can be concluded from the above, that despite the necessity of dental treatment in young children with dental cavities, a lot of these children remain untreated because of dental anxiety and the associated dental behaviour management problems. The aetiology of both dental anxiety and dental behaviour management problems is multifactorial. Extensive research has already focused on dental anxiety. As dentists blame parental rearing style for the occurrence of uncooperative behaviour in children it is interesting to focus on this topic. If an association exists between parental rearing and dental anxiety and dental behaviour management problems, this might not only be interesting, but can have important clinical implications. Especially when parents can be learned to deal with their child's dental anxiety or in advance of their child's dental visit.
Aim and structure of the thesis

The aim of this thesis is to study child dental anxiety and behaviour management problems during dental treatment. The focus lies especially on the role of the parents and their parenting style. The studies described in this thesis are divided into three interlinked parts. Part I consists of background studies concerning several questionnaires used in the present thesis. Part II comprises studies about parental rearing style, and part III contains clinical studies. The thesis ends with a summary, a general discussion and a Dutch version of the summary.

As a result of editorial considerations, the chapters are not ordered chronologically within the thesis. Lay-out of text, tables, figures and reference style is made uniform. Since most chapters were published in different peer-reviewed journals, and often discuss the same topics from different angles, considerable overlap between the chapters does exist. Different journal requirements have also created some variations in terminology.

Background studies

This first part of this thesis concerns studies in which some questionnaires, which were used in the second and third part of thesis these were analysed.

As mentioned before, dental anxiety in children is a common phenomenon, but assessment and evaluation of this anxiety can be difficult. Anxiety can be measured using behaviour observations or by using questionnaires. When using observational techniques, it is very difficult to recognize dental anxiety and distinguish it from, for example, pain or movements of the child. Also, using an observational technique is very time consuming. Therefore in research situations, it is easier to use questionnaires for the assessment of dental anxiety. However, in the child dental population, especially the selected population used in this thesis, using questionnaires to assess dental anxiety is impossible as most of these children are between 3 to 6 years old and not able to read and write and therefore not able to fill out a questionnaire. Moreover, these toddlers and preschoolers lack cognitive skills and abstraction level to think and report about their own situation. Therefore, in most studies on dental anxiety in child populations, the proxy measure of their parents is used. Parents are asked to fill out the questionnaire on dental anxiety on behalf of their child. In dental literature the Child Fear Survey Schedule (CFSS-DS) is commonly used.

The study reported in Chapter 1 describes the parent-child agreement on child dental anxiety using the Child Fear Survey Schedule - Dental Subscale (CFSS-DS), testing three specific hypotheses. As parents tend to overestimate their children’s dental pain compared to the children themselves [Versloot et al., 2008], it is hypothesized that parents will overestimate the dental fear of their children as well (I). Since anxious people tend to overestimate anticipated pain and the intensity of adverse events in general, including such events as fear [Arntz et al., 1994; Rachman, 1994], it is also expected that anxious parents overestimate the fear of their children (II). In addition, it is hypothesized that there is a relation...
between parental dental fear and child dental fear (III).

Most children, who are referred to a paediatric dentist for dental treatment, are very young. Some of these children are so called preventive referrals, implicating that the family dentist refers them before having tried actual dental treatment, expecting that the treatment will exceed his clinical child management routine. Before starting treatment of young children it is very helpful to know their level of (dental) anxiety. As these children have not actually experienced a dental treatment, it is difficult for their parents to fill out the CFSS-DS, especially the dentist specific items of this questionnaire. For this reason, the Inventory of Stressful Situations (ISS) was constructed based on structured interviews with mothers of young children on their children’s reaction to stressful events during daily life. Chapter 2 aims to assess whether the ISS can be used to predict dental anxiety in young children.

The assessment of parental rearing style can be difficult and time consuming. As the Child Rearing Practices Report (CRPR) is a widely used questionnaire on parental rearing style, this questionnaire was chosen to be used in the studies on parental rearing style in this thesis. However, looking deeper in the structure of this questionnaire, it seems that this questionnaire measures more error than latent trait. Measurement error may obscure associations (for instance between factor scores and observed behaviour) or group differences (mean scores between different samples of children). The aim of Chapter 3 is to use the CRPR in a juvenile dental population and to assess its factor structure and psychometric properties as a basis for subsequent studies.

*Parental rearing style*

When treating children in the dental situation, the question arises why some children exhibit behaviour management problems, where others, despite a comparable level of dental anxiety, do not. Therefore, Chapter 4 aims at examining the relationship between parenting style, the child’s dental anxiety, and the children’s behaviour during dental treatment. In addition, the way the parents prepared their children for dental treatment is assessed, hypothesizing that permissive and rejecting-neglecting parents would tend to prepare children in a less supportive way, which might lead to disruptive behaviour during dental treatment.

The objective of the study reported in Chapter 5 is to assess the possible associations between dental anxiety and parental rearing style. Besides, it was assesses whether these children were referred for dental treatment to a special dental care clinic or not.

Chapter 6 describes a study aimed at examining the relationship between self-reported rearing style using four different questionnaires and the parent’s assessment of their child’s dental anxiety. As dental treatment can directly lead to dental anxiety associated with behaviour management problems, we also examined the association between the child’s dental history and dental anxiety as reported by parents on one hand and parenting style on the other.

*Clinical studies*

Paediatric dentistry is a very practical profession. All technical dental issues can be learned
in a pre-clinical environment. At the dental school all these skills are practiced by dental students on phantom head set ups using plastic teeth in plastic heads. However, communications skills and behaviour management strategies can only be taught in real patients. As such, a thesis about child dental anxiety and behaviour management would not be complete without clinical studies.

As there are continued questions on the advisability/desirability of the presence of parents in the surgery, and as there is limited information in the Netherlands on the effect of parents’ presence on their child’s behaviour during treatment, it was decided to further look into this problem. The aim of Chapter 7a was to assess the influence of the presence of the parent in the surgery on their child’s behaviour during dental treatment. The aim of Chapter 7b was to assess the opinion of children, parents and dentists about child behaviour when parents are absent or present in the surgery. And secondly to assess whether, if parents’ presence influences the treatment, the dentist can decide which parents to allow in versus keeping out of the surgery.

As mentioned earlier, one possible explanation for the acquisition of dental fear on one hand and the exhibition of uncooperative behaviour on the other hand are the personality traits and the negative emotionality of a child. More explicit behaviour management problems would be expected in externalizing children, while the discomfort or dental anxiety in an internalizing child could easily be missed, thereby overcharging this child. Therefore, in Chapter 8 the relationships between emotional and behavioural problems, dental anxiety and dental behaviour problems displayed during dental treatment are investigated.

Following the theory of latent inhibition, children who do not have the opportunity for several positive or neutral dental visits before a intrusive dental visit is done are at risk of becoming dentally anxious. This anxiety can be treated using gradual exposure. Children with Cleft Lip Palate (CL/P) are exposed to repeated medical and dental procedures in early childhood. Therefore, they are at risk of developing dental anxiety. In previous research it has been shown that CL/P children were more anxious than normative Dutch children. The aim of Chapter 9 is to test the hypothesis that continuous exposure to neutral dental treatment, such as regular dental check-up, could lead to a reduction of the dental anxiety of CL/P children and to assess the role of coping strategies in the persistence or reduction of dental anxiety.

The thesis ends with a summary, a general discussion and a Dutch version of the summary. In the general discussion, the main outcomes of the studies will be discussed. We hope that the present thesis will provide additional insight in the interaction between dental anxiety and behaviour management problems.
References


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