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### Pathological forms of dental anxiety : aetiology, prevalence and fear evoking aspects

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# CHAPTER 7

## SUMMARY AND GENERAL DISCUSSION

This chapter contains a summary of the most relevant outcomes of this thesis as well as a general discussion that addresses the most important results, clinical implications and suggestions for future research.

The main objective of this dissertation was to increase knowledge on, and understanding of, the dynamics of pathological forms of dental anxiety. Hereto several issues have been studied: (1) the prevalence rates of dental fears and dental phobias, (2) the structure of specific phobias, (3) the anxiety-provokingness of dental stimuli and (4) the aetiology of dental anxiety and phobia. First the main results will be reviewed. Next, the relevance of the findings and their theoretical and clinical implications will be addressed.

## Summary

In *Chapter 2* the point prevalence of dental treatment fear and phobia relative to ten other common fears and specific phobias (i.e. fears and phobias of injections, snakes, spiders, thunder, enclosed spaces, physical injuries, darkness, flying, heights and blood) in a large population-based sample (N=1969) was studied. The results indicated that dental treatment fear was the fourth most prevalent fear (24.3%), following the more prevalent fears of snakes (34.8%), heights (30.8%) and physical injuries (27.2%). A phobia of dental treatment appeared to be the most prevalent phobia with a prevalence of 3.7% followed by phobias of heights (3.1%) and spiders (2.7%). It was also found that fear of dental treatment was rated as more severe and was more strongly associated with intrusive re-experiencing than any other fear. In sum, it would seem that dental treatment phobia is the most prevalent phobia while dental treatment fear is not the most prevalent fear, but is, compared with other fears, characterised by the largest impact both in terms of severity and impairment.

*Chapter 3* aimed at contributing to the development of a framework for describing the structure of common fears. Hereto, the structure of eleven common fears was assessed, of which ten fears (i.e. fears of injections, snakes, spiders, thunder,

enclosed spaces, physical injuries, darkness, flying, heights and dental treatment) were previously used in a factor analytic study by FREDRIKSON *et al.* (1) and one fear (blood) was added in the current study. Using data from the Dutch general population (N=965), a principal component analysis (PCA) was performed on the severity of the fears to delineate the multidimensional structure of the eleven fears. The newly derived model was tested against two other models (Fredrikson's model consisting of three factors: a situational cluster, an animal cluster and a mutilation cluster: 1) and the DSM-IV-TR model (consisting of an animal cluster, a natural-environment cluster, a situational cluster and a blood-injury-injection cluster (2)) using the data of a second sample of the Dutch population (N=1,004). Results supported a three-factor solution with a blood-injection-injury factor, a situational-animal factor and a heights-related factor. The confirmatory factor analysis resulted in an acceptable fit for each of the three fitted models. The present results provide support for a structure of fears which is largely compatible with the currently recognised classification of phobia subtypes within DSM-IV-TR.

In *Chapter 4* a study is described with two main aims: (1) to establish a hierarchy of anxiety-provoking capacities of a large set of dental stimuli and (2) to derive an estimate of the number of stimuli to be presented to anxious patients in order to obtain full coverage of their dental fears. Hereto, a questionnaire consisting of 67 potentially anxiety-provoking stimuli was constructed and presented to 960 adults. Results showed that the most invasive stimuli (e.g. surgical procedures, root canal treatment and pain) were rated as most anxiety provoking. This in contrast with less invasive stimuli related to the dental office (e.g. waiting room or bright lights), the dentist as a person or dental equipment (e.g. protective garb or dental chair), which were rated as least anxiety provoking. In addition, it appeared that the top 25 most anxiety-provoking objects and situations found in the current study contained only eight (28%) stimuli that had been taken into account in previous research. Probably the most interesting result is that only a limited coverage of patients' fears can be

obtained when a small set of questions pertaining to potentially anxiety-provoking stimuli is used. More specifically, the results suggest a great variety of stimuli people may be potentially fearful of. Therefore, a large set of stimuli present in the dental setting should be presented when all stimuli people might fear are meant to be covered. The findings of this part of the study cast serious doubts on the completeness and validity of available assessment procedures used in both research and clinical settings aimed at determining patients' anxiety-evoking stimuli.

In *Chapter 5* the Level Of Exposure-Dental Experiences Questionnaire (LOE-DEQ) was introduced and results with regard to the psychometric properties (i.e. validity and reliability) of the LOE-DEQ were presented. The LOE-DEQ was developed in order to increase understanding of the development of dental anxiety and to identify those at increased risk for developing dental anxiety. The psychometric properties were assessed using five different samples, i.e. general dental patients (N=480), students (N=186), highly anxious patients (N=119), psychiatric outpatients (N=17) and oral surgeon patients (N=34). The results showed that the LOE-DEQ has an acceptable level of internal consistency, satisfactory test-retest reliability and adequate discriminant, concurrent and predictive validity. In addition, the results pointed at a dose-response relationship between distressing experiences and the development of dental anxiety. That is, individuals who reported higher levels of dental anxiety also tended to report more distressing experiences. Finally, it was deduced that the LOE-DEQ is a useful additional screening tool in assessing a patient's background in terms of previous exposure to distressing dentistry-related events, which is considered a vulnerability factor in the development of dental anxiety.

The main purpose of *Chapter 6* was to determine which distressing dental experiences and general traumatic experiences, assessed retrospectively, were most closely associated with excessive levels of current dental anxiety. In a sample consisting of 1,464 general dental patients, it was assessed which combinations of distressing experiences were most strongly associated with a pathological level of

current dental anxiety. Results showed that pathological levels of dental anxiety were not significantly associated with reports of traumatic experiences outside the dental setting, but were significantly related to a number of events within the dental setting. The retrospective reports of helplessness during treatment appeared to be most strongly associated with pathological levels of dental anxiety. Moreover, it was found that in addition to the subjective experience of helplessness other forms of emotional (i.e. embarrassment) or interoceptive (i.e. internal feelings related to suffocation or being nauseas) responses were strongly associated with pathological levels of dental anxiety.

## General discussion

### Prevalence of dental fear and phobia

In *Chapter 2*, prevalence rates of dental fears and phobias were compared with those of ten other fears and phobias. In addition, severity ratings and reports of intrusive re-experiencing among people with dental fears were compared with those found among people with other fears.

Prevalence rates of dental treatment fear in the current study appeared to be higher than in previous studies conducted in the United States and Australia (3-5). One possible explanation is to be found in the demographic and social composition of these countries (6). In future research it is important to investigate whether the prevalence rates of dental treatment fears found in the current study are in line with rates reported by people in other European countries or whether these are solely characteristic of the Dutch population. In addition, it was found that dental treatment fear had more impact on Dutch citizens than most other fears, both in terms of reported severity and re-experiencing symptoms. As the high impact in terms of severity and the presence of re-experiencing symptoms in dental treatment fear were assessed using a Visual Analogue Scale (severity) and a question with a yes/no response format (re-experiencing), future studies should aim at assessing this type of symptomatology with more specific standardised and validated instruments, such as the Impact of Event Scale-Revised (IES-R) (7).

The prevalence rate of dental treatment phobia was generally in line with the other two previous European studies applying DSM-IV-TR criteria (1, 8). However, it is unknown whether the prevalence rate of dental treatment phobia in the general population is consistent with rates from the USA, because no comparable data on this phobia subtype are available. In sum, the relatively high prevalence rate of dental phobia in the current study, and the fact that in epidemiological research dental

treatment phobia has seldom been a topic of investigation, warrant studies on the prevalence of this phobia subtype in other populations across the world.

One of the most important practical implications of the study on the prevalence of dental treatment fear and phobia is that, given the high prevalence of dental fear (24.3%) and phobia (3.7%) in the general population, dentists need to be aware of patients who fear dental treatment. They could prevent people from becoming anxious or prevent the development of pathological forms of dental anxiety by increasing both sense of control and predictability while treating them (9). Whenever dentists encounter patients with phobic fears, they should refer them to dental fear clinics in order to reduce excessive fears and allowing renewed treatment by a general dental practitioner (9).

### **Clustering of fears**

Studies that have examined the factor structure of common fears and their convergence demonstrated discrepant findings with the number of fear factors or clusters that were derived, i.e. varying between two and five (1, 10-18). The results presented in *Chapter 3* provide support for a structure of fears consisting of three clusters (a blood-injection-injury, a situational-animal and a heights-related cluster) largely reflecting the current DSM-IV-TR division of phobias consisting of five discernable factors or subtypes. Even though in *Chapter 3* corroboration was found for the existence of three clusters, the lack of homogeneity within these fears might be a problem. For example, dental treatment fear has been found to consist of at least 67 stimuli which have the potential to provoke anxiety (see *Chapter 4* of this thesis). Among these stimuli are several aspects of the drill or needle, root canal treatments, the dentist or the white gown etc., indicating that this so-called specific fear is not that specific, but is rather quite heterogeneous. In addition similar findings have been reported by VAN GERWEN *et al.* (19) who found that fears of flying were not homogeneous either. It seems important to keep in mind that even though clusters

seem homogeneous across studies, within-cluster heterogeneity is often present and needs special attention.

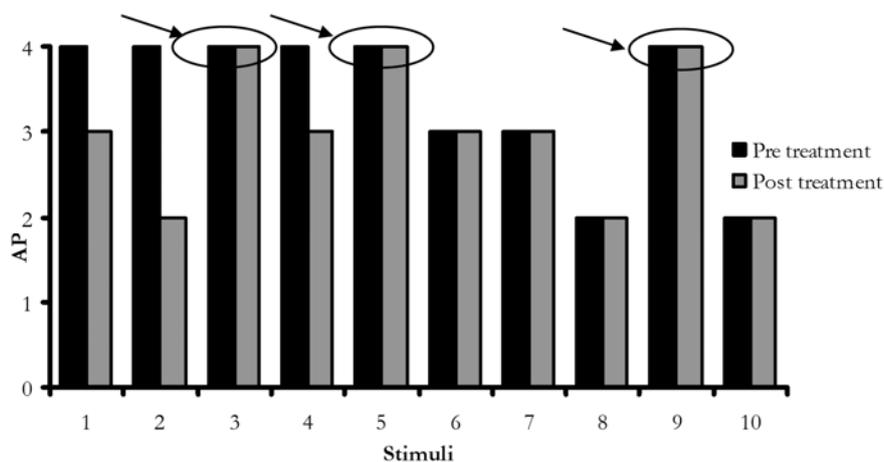
Future studies should focus at exploring the DSM-IV-TR classification of fears in more detail. Especially studies including combinations of statistical methods, such as factor analysis and cluster analysis, as well as a larger number and variety of fears (e.g. more types of animal fears) are needed. Since the structure of fears found in *Chapter 3* is in line with the current DSM-IV-TR classification of phobia subtypes, it could be argued that subclinical fears are associated similarly to clinical phobias. That is, a phobia could be considered a severe form of a fear as both are two observable manifestations of a fear response along a single continuum. This might have positive clinical implications because assigning fear to similar clusters as used in the DSM may help guiding providers of mental health services in the assessment and treatment of their fearful patients.

### **Stimuli present in the dental setting**

Because of the shortcomings of previous research (see Introduction) we developed a measure that can be used to screen for a broad range of anxiety-provoking dental objects and situations (see *Chapter 4*). The results showed a large variety in stimuli that people potentially may rate as anxiety provoking. Therefore, it is recommended that dentists specialised in the treatment of highly anxious patients use assessment procedures covering large numbers of potentially anxiety-provoking stimuli. This would not only provide a ‘personal profile’ of each patient, but this may also add to positive treatment outcomes. That is, if the dentist working in a dental fear clinic has a detailed picture of his patients’ feared objects and situations, he has a clear starting point for specific treatments such as gradual *in vivo* exposure.

It is hoped that future endeavours focus on the effectiveness and practical application of this newly developed measure. That is, patients could be invited to complete this questionnaire both before and after treatment. This would demonstrate

whether there is a significant change in patients' 'personal profile' of anxiety-provoking stimuli as a consequence of their treatment in a dental fear clinic (see Figure 1). Since in a dental fear clinic generally only a limited number of stimuli are assessed, and treatment is focused on (the extinction of) even fewer of them, fears of certain stimuli may remain present even after successful treatment. It cannot be ruled out that (a combination of such) stimuli with a relatively limited capacity to evoke anxiety may result in future problems to be encountered in general dental practice. A patient-related profile could particularly be helpful when a patient returns to a regular dentist, as it can provide the dentist with a clear picture of which objects and situations are still being experienced as fearful [see Figure 1].



**Fig 1** The *Anxiety Provokingness of 10 stimuli pre and post treatment*

Another important issue of this thesis pertains to the validity of the terminology 'fear of dentists' used in previous epidemiological studies (see for example, 1, 4). That is, of the 67 stimuli assessed in *Chapter 4*, 65 were rated as more anxiety provoking than the dentist as a person. Therefore, it is suggested to refrain from using the term 'fear of dentists'. The term 'fear of the dental treatment' is a more

appropriate description and includes more potentially anxiety-provoking aspects present in the dental setting.

### **Aetiology of dental anxiety**

*Level Of Exposure-Dental Experiences Questionnaire (LOE-DEQ)* The LOE-DEQ seems to fill a gap in the dental anxiety literature, as it is an instrument -with adequate psychometric properties - that can be used to assess systematically the occurrence of distressing events in the past. The LOE-DEQ has proven to be a valuable instrument to screen for various ‘damaging’ aspects of the dental setting in terms of ‘psychological scars’ or impact on patients’ functioning within the dental setting (see *Chapter 5*).

Directions for future research on the LOE-DEQ might encompass particularly the study of the practical implications of the scores on the LOE-DEQ. It would be enlightening to investigate whether patients who report relatively few distressing dental procedures in the past would respond better to exposure *in vivo*, while those with many disturbing memories of experiences involving helplessness or other distressing emotional reactions would respond better to evidence-based treatment of the processing of traumatic memories, such as Eye Movement Desensitization and Reprocessing (EMDR) (20, 21). Another direction for future studies on the LOE- DEQ might include efforts aimed at exploring the potential additional benefits of the LOE-DEQ. In future studies it would be enlightening to study the usefulness of the LOE-DEQ in predicting debilitating symptoms such as avoidance tendencies, anger or difficult behaviours and trauma-related symptomatology (i.e. insomnia, re-experiencing and loss of interest).

***Distressing dental experiences and dental anxiety*** This thesis also presents the first study assessing a broad spectrum of distressing dentistry-related experiences and their relationship with present levels of dental anxiety (see *Chapter 6*) in a large sample

of general dental patients. Although it was expected that pain or distressing dental procedures such as root canal treatments and extractions would be most strongly associated with high levels of dental anxiety (see for example, 22-24), it was found that the most important factor precipitating pathological levels of dental anxiety was helplessness, followed by other types of emotional states (i.e. embarrassment) and interoceptive responses (i.e. nausea and suffocation). Helplessness is defined as a feeling associated with the perceived failure to control a potential stressful situation which potentially undermines a positive identity of being competent to protect oneself and others against potential harm (25). The importance of helplessness or lack of control is not limited to the field of dental anxiety *per se*, but has been recognized as a significant factor in the area of traumatic stress for a long time. Research on traumatic stress, for instance, indicated that a sense of helplessness and a disruptive emotional reaction occurring at the time of an experience are most predictive of PTSD symptomatology (26, 27). It may be that the experience of helplessness and the disruptive emotional reaction associated with it make people vulnerable to the development of dental phobia in a similar way.

In *Chapter 6* it was reported that emotional reactions in response to previous distressing dental experiences were found to be associated with current dental anxiety level. Emotional reactions as possible etiological factors in the development of anxiety disorders have been studied by RUBEN *et al.* (28) who found that emotionally intense events are more likely to be rehearsed. Ruben and his colleagues argue that the rehearsal of emotional events retains and strengthens the memory traces of these events, and that this rehearsal is likely to consolidate the memory for a relatively long period of time (28).

Typical interoceptive responses (nauseas and suffocation), which may be the result of past interoceptive conditioning, were also found to be related to the development of dental anxiety. In this respect interoceptive conditioning has been defined as 'classical conditioning in which either the conditioned stimulus (CS) or the

unconditioned stimulus (UCS<sup>1</sup>) or both are delivered directly to the mucosa or some other specific organ' (29). Thus, interoceptive conditioning is considered to encompass UCS's that stimulate sensory receptors in the gut or lungs. It has been claimed that responses resulting from interoceptive conditioning are harder to extinguish than responses resulting from exteroceptive conditioning, because it includes UCS's inside the body, and is unconscious in nature (29). Until now, the concept of interoceptive conditioning in anxiety disorders has not received much research attention (30). One exception is a study conducted by HAUG *et al.* (31), in which a significant association is reported between nausea and the occurrence of anxiety. As it seems that dental phobia can partly be explained on the basis of interoceptive conditioning, it would be challenging to assess to what extent interoceptive conditioning is an important factor in the development of other subtypes of specific phobias, and other categories of anxiety disorders.

The fact that the total variance accounted for in dental phobias by the 23 distressing events assessed in the current study was about 35%, leaves a large proportion of the variance in the development of dental treatment phobias unaccounted for. New research endeavours might involve determining whether there is a genetic basis for individual differences in susceptibility to develop phobic fears about dental treatment. More specifically, studies might investigate whether the presence of certain (combinations of) gene polymorphisms -which play a crucial part in the functioning of the so called HPA-axis- elevates peoples' vulnerability for developing fear symptoms.

To prevent helplessness and other emotional distress precipitating the development of severe dental anxiety, it is essential that after graduating from dental

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<sup>1</sup> In classical conditioning a unconditioned stimulus (UCS) is a stimulus that unconditionally, naturally, and automatically triggers reflexive behaviour. It is called unconditioned because learning is not a necessary condition for the stimulus to control behaviour. During the process of conditioning a neutral stimulus (for instance the sound of the drill) is repeatedly paired with a UCS (for instance pain). The initial response to the UCS is the UCR (anxiety). After the conditioning process the sound of the drill (CS) causes anxiety responses (CR).

schools sustained effort should be put in retaining attention for the role of dentists in the prevention of dental anxiety. This may be done by means of post-graduate courses and conferences. However, a common problem is that not all dentists attend the existing, non-mandatory, post-graduate courses or conferences on these themes. Thus, special focus might be more on articles in dental journals specifically directed at general dental practitioners, advertisement, and recruitment among general dental practitioners to persuade them to attend these instructive events.

### **Final remarks**

In this thesis mainly factors associated with the development of dental treatment anxiety are presented. That is, the prevalence, aetiology, stimuli and the relationship of these factors with dental treatment anxiety were subject of research. It would be interesting to study the relationship between causes and consequences of pathological forms of dental anxiety in more detail. For example, issues such as comorbidity (co-existence of other anxiety disorders, depression etc.) and its impact on oral health, general health and daily functioning could be addressed.

The second shortcoming pertains to a more technical aspect of this dissertation. That is, mainly questionnaires were applied in the assessment of pathological forms of dental anxiety. In the ideal situation a construct should be operationalised by a multiplicity of methods, which is sometimes referred to as *convergent operationalism* (32, 33). In the current study a more frequent use of both questionnaires and face-to-face interviews would have added to the validity of the data. In this dissertation it was chosen to conduct research in large healthy samples often approached in public places. In order to keep the threshold for completing the questionnaire as low as possible, it was decided to use only one instrument assessing dental anxiety (see for example, *Chapter 4*), phobia or fear (*Chapter 2*) in each study.

A final shortcoming in the present thesis is that even though in three studies large samples were included (*Chapter 4, 6*), the number of immigrants was too small to draw any conclusion regarding ethnicity. However, as our society increasingly becomes more diverse it seems important to pay more specific attention to immigrant groups. Besides immigrant groups, in the future more effort should be put into investigating other minority groups (elderly, disabled and less advantaged people) as well.

### **Conclusions**

The current thesis has attempted to increase the knowledge and deeper understanding of the dynamics of pathological forms of dental anxiety by the development of two instruments: an instrument assessing the anxiety-provokingness of stimuli (*Chapter 4*) and the LOE-DEQ (*Chapter 5*), which can be helpful in the assessment and treatment of highly dentally anxious patients. Because the dental treatment setting is a highly complex environment, encompassing a large number of dentistry related stimuli, it is advocated that dentists treating highly anxious patients should use large numbers of items when assessing the fears of people with high levels of dental anxiety. The current thesis also contributes to the current knowledge by showing that emotional distress (helplessness, embarrassment) and interoceptive responses (nausea and suffocation) experienced during treatment are likely to play a significant role in the development of dental anxiety.

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