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

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CHAPTER 1

INTRODUCTION

Although almost everybody feels at least some inconvenience when visiting a dentist, usually this apprehension does not cause long-term avoidance of dental care. However, people with high levels of dental anxiety often report long-term or even complete avoidance of dental treatment and do report that their extreme anxiety has a large impact on daily life in terms of limited functioning and oral health-related problems (e.g.: 1-3). That is, most highly-anxious people show many years of avoidance and a large number of missed and/or cancelled appointments (4-8). As a consequence severely deteriorated teeth are frequently reported, as well as significant problems in psychosocial-functioning, working-life and in both general and oral health (9-12).

A number of theses have been written on the subject of dental fear and dental anxiety in adult patients, among which Dutch ones (13-16) and non-Dutch ones (e.g. 17-21). Only one of these theses paid specific attention to dental phobia (21). The *general aim* of the present thesis is *to increase knowledge on and understanding of the dynamics of pathological forms of dental anxiety*. This knowledge might be helpful in terms of (1) prevention of the development of pathological forms of dental anxiety and (2) development and implementation of treatment methods for patients displaying pathological forms of dental anxiety. Hereto, several relevant topics will be discussed in this introduction. Firstly, the concepts of dental fear, dental anxiety and dental phobia will be defined and data on prevalence rates will be presented. Secondly, the literature will be reviewed with respect to the structure and clustering of specific phobias in the most widely used classification system for mental disorders, the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) (22). The next step involves the presentation of research on several dental stimuli present in the dental setting. Finally, the relevant literature on the aetiology of dental anxiety and dental phobia will be introduced and evaluated. Gaps in the literature are assessed in these fields of interest, which form the basis for this thesis.

Dental fear, dental anxiety, dental phobia and its prevalence

Dental fear, dental anxiety and dental phobia are concepts that are often used interchangeably. However, even though they are closely related, it has been proved to be possible to unravel these concepts. Dental fear is considered to be a common response to one or more specifically threatening stimuli in the dental setting or to the dental setting in general, and is therefore considered an adaptive and healthy response (23). This in contrast to dental anxiety, which is more diffuse and which response is no longer directly related to a direct threat, as it has become anticipatorily orientated towards future events, rather than being a direct adaptive response (23, 24). Dental phobia represents a severe form of dental anxiety and is characterised by a marked and persistent fear in relation to either clearly discernible situations/objects (e.g. drilling, injections), or to the dental situation in general, and has a significant influence on daily functioning. The term dental phobia by definition refers to a pathological condition and is accordingly included as a specific phobia in the Diagnostic and Statistical Manual of Mental Disorders (DSM–IV-TR) published by the American Psychiatric Association (22). According to the DSM-IV-TR the criteria for the diagnosis of a ‘specific phobia’ are (i) a marked and persistent fear which is excessive and unreasonable, (ii) exposure to the phobic stimuli almost invariably provokes an immediate anxiety response, (iii) the person recognises that the fear is excessive or unreasonable, (iv) the phobic situation is avoided or endured with intense anxiety or distress and (v) the avoidance, anxious anticipation, or distress in the feared situation(s) interferes significantly with the person’s normal routine, occupation or (academic) functioning or social activities or relationships, or there is marked distress about having the phobia (22).

Prevalence rate of dental fear To date, prevalence rates of dental fear relative to other fears in European countries based on large representative samples are

completely lacking. Three studies have been conducted on the prevalence of dental fears (c.f. Table 1). Two in the United States of America, the first by AGRAS *et al.* (25) and the second by Fiset *et al.* (26). One -more recent study- was carried out in Australia by ARMFIELD *et al.* (27). In these three studies, prevalence rates of 19.8, 13.1 and 21.9% were found. Dental fear was measured in these studies using one-question Likert-type scales and was operationalised as either (1) a mild fear, (2) some fear or (3) a little afraid or distressed. However, in the first two studies (25, 26) dental fears were studied relative to other fears whereas in the last study (27) dental fear was the only topic of research. Because of the different demographical and social composition of these populations it seems unlikely that prevalence data from the studies conducted in the United States and Australia can be generalised to European populations (28).

Prevalence rate of dental anxiety Summarising the results of prevalence studies on dental anxiety, Table 1 shows that the prevalence of dental anxiety varies from 3.9 to 11.7% across several countries and populations. In each of the studies, prevalence of dental anxiety was the main topic of research. As displayed in Table 1, results of the studies on the prevalence of dental anxiety are not consistent, largely because of the considerable variability in sampling methods (i.e. random sampling, convenience samples and consecutive elective patients of a clinic) and measures (i.e. interviews or questionnaires). Even in studies in which validated instruments indexing level of dental anxiety were used to determine the severity of dental anxiety, different cut-off scores were used. More specifically, in some studies, a score of ≥ 13 on the Dental Anxiety Scale (DAS) (29) was applied, while in other studies a DAS score of ≥ 15 was taken as a cut-off score. However, self-report measures, such as the DAS, are developed to identify people who need special attention, and to tap symptom severity as well as treatment effects (30). Because no studies have assessed the performance of such measures as a diagnostic tool for the assessment of excessive, pathological or

phobic mental health conditions (i.e. dental phobia), their use for diagnostic purposes on individual or population level seems problematic.

Prevalence rate of dental phobia Until now, only two studies have examined the prevalence of dental phobia. The prevalence rates, which were reported, varied between 2.4% (31) and 2.1% (32). One of the main problems of these studies is that dental phobia was operationalised in a rather narrow way. In the former study (31) subjects were asked whether they were reporting a phobia of ‘going to the dentist’ and in the latter (32) they were asked whether they reported ‘a phobia of the dentist’. These operationalisations could easily have been misinterpreted by the respondents. A major drawback of the STINSON *et al.* (31) study is that an interview called Alcohol Use Disorder Associated Disabilities Interview Schedule –DSM-IV version (AUDADIS-IV) was used. This interview is based on the DSM-IV, but was clearly not specifically designed to assess specific phobias. A second drawback is the fact that lifetime prevalence was assessed in this study rather than point prevalence. Lifetime prevalence is the number of individuals in a population who at some point in their life suffered from a certain disorder, compared with the total number of individuals. That is, lifetime prevalence includes both current disorders and disorders which are in remission, whereas point prevalence refers to the presence of a specific disorder compared with the total number of individuals (for definitions see, for example, 33, 34). As in point prevalence only present diagnoses are counted, it provides a more accurate picture of the presence of a particular disorder in a specific population at a specific moment in time. Although the study conducted by FREDRIKSON *et al.* (32) has probably generated the most reliable estimate of dental phobia prevalence in the general population to date, it also has a number of other limitations, which need to be acknowledged. First, their sample of 700 subjects was limited to one urban area in Sweden (Stockholm). An even more important limitation of their study is that the screening questionnaire did not contain an explicit question pertaining to the

diagnostic criterion of impairment, in terms of significant interference with daily functioning, which is a necessary criterion to define a specific phobia in terms of a DSM-IV-TR diagnosis. Thus, valid information on the prevalence of dental phobia in comparison with other specific phobias in the European population is still lacking¹.

Clustering of fears

The Diagnostic and Statistical Manual of Mental Disorders 4th revised edition (DSM-IV-TR) (22) is highly valued for providing a reliable framework to describe the nature and structure of a wide range of mental disorders based on clearly operationalised criteria. The DSM-IV-TR is widely used in research, as well as for practical purposes. One of the anxiety-related conditions that can be diagnosed using this classification system is specific phobia. Specific phobias are highly prevalent with rates of around 10% across several populations (44-47), and have been found to cause significant rates of impairment, stress and comorbidity (48). Although this classification of subtypes is widely used, its scientific basis has not been fully established and could be questioned on several grounds (49-51). One of the concerns relates to the theoretical underpinning. Historically, this classification was arrived at by clustering according to the content of fears (52). That is, the five subtypes were based on their relation with variables such as age of onset, gender ratio, physiological response, focus of apprehension and response to treatment (52).

¹ In this thesis dental fear is assessed by means of a single item questionnaire with a yes/no response format. Dental anxiety is studied by means of two questionnaires consisting of multiple items (Dental Anxiety Scale and the Short Dental Anxiety Inventory) and dental phobia is diagnosed by means of the DSM-IV-TR based Phobia Checklist.

Table 1 *Studies on the prevalence of dental anxiety in the general population, screening instruments, criteria and main results*

Author	Year	Area	N	Sample characteristics	Instrument	Prevalence %	Cut-off score/criterion
Dental fear							
AGRAS <i>et al.</i> (25)	1969	Greater Burlington area USA	325	A probability sample	Structured Interview	19.8	Mild dental fear
FISER <i>et al.</i> (26)	1989	Seattle USA	1,019	Randomly selected sample by random digit dialling &	Telephone interview & questionnaire	13.1	Some fear
ARMFIELD <i>et al.</i> (27)	2008	Australia	3,937	A stratified national sample	Global question	21.6	Little afraid or distressed
Dental anxiety							
GACHEL <i>et al.</i> (35)	1983	Dallas USA	105	Randomly selected sample by random digit dialling	10 point Dental Anxiety Scale & question on avoidance	11.7	Score 8-10 high fear
HALLSTROM & HALLING (36)	1984	Gothenburg Sweden	784	Representative systematic sample	Semi structured interview	4.3	Degree anxiety and avoidance behaviour
STOUTHARD & HOOGSTRATEN (37)	1990	The Netherlands	648	A weekly surveyed panel representative of the Dutch population	Dental Anxiety Questionnaire	3.9	Stanine 9 (score > 142)
LOCKER & LIDDEL (38)	1991	Ontario Canada	580	Community sample age \geq 50 year	Dental Anxiety Scale	7.8	> 13
LIDDELL & LOCKER (39)	1997	Toronto Canada	2,609	Sample randomly selected from the voters list	Dental Anxiety Scale	10.7	> 13
WOODMANSEY <i>et al.</i> (40)	2005	USA	100	Patients university clinic	Dental Anxiety Scale	4.0	> 15
EITNER <i>et al.</i> (41)	2006	Germany	374	Adult male soldiers	Dental Anxiety Scale	4.6	> 15
ENKLING <i>et al.</i> (42)	2006	Bochum Germany	300	Pedestrians	Hierarchical Anxiety Questionnaire (HAQ)	11	> 38
NICOLAS <i>et al.</i> (43)	2007	France	2,725	Convenience sample	Dental Anxiety Scale	7.3	> 15
Dental phobia							
STINSON <i>et al.</i> (31)	2007	USA	43,093	Representative sample of the adult population in the USA	Alcohol Use Disorder and Associated Disabilities Interview Schedule-DSM-IV version	2.4	Lifetime prevalence, DSM-IV-TR criteria
FREDRIKSON <i>et al.</i> (32)	1996	Stockholm Sweden	704	Randomly selected from a population-based registry	DSM-IV	2.1	Three DSM-IV-TR criteria

A differentiation based on these variables is, however, open to discussion. For example, in a recent meta-analysis of treatments of specific phobia, it was found that the effect sizes for the outcomes of psychological treatments were not moderated by type of specific phobia (53). These results suggest that treatment response may not be a meaningful criterion in grouping phobias into subtypes. In addition, one might question whether a qualitative method is most suitable in developing a diagnostic classification system. Probably the most important concern pertains to the lack of factor-analytic data to support the current DSM-IV classification. Initially, no statistical analyses, for instance based on meta-analyses, were provided confirming the proposed DSM classification of phobia subtypes (52). However, even to date, there is still little data available concerning the coherence and validity of the clusters (50, 53, 54). In fact, only eight groups of researchers have studied the factor structure of phobic fears (32, 49, 55-60). The number of phobia subtypes that were derived varied between two and five. However, it should be noted that four of these eight studies used the Fear Survey Schedule (FSS) as the measurement tool of phobic fears (55, 56, 58, 59). The usefulness of the FSS in the classification of phobic fears could be questioned, as the relationship with the specific phobia diagnosis within DSM-IV-TR lacks specificity. For example, fears of getting a serious illness may be connected to the specific phobia subtype blood-injection-injury phobia, but also to obsessive-compulsive disorder (61, 62) or hypochondrias.

Until now, all factor analytic studies (N=4) that have been conducted and have employed a series of common phobic fears, failed to find full support for the currently recognised DSM-IV-TR classification of phobia subtypes (32, 49, 57, 60). Thus, in view of the discrepant findings regarding the factor structure, and thereby on the underlying dimensions of the current specific phobia diagnosis, it remains to be seen whether the current restrictive diagnostic template of the specific phobia diagnosis within DSM-IV-TR is meaningful and empirically valid and whether the

structure of fears generally corresponds to the phobic dimensions retained in the DSM-IV-TR.

Stimuli present in the dental setting

The dental setting is a highly complex environment consisting of a broad range of objects and situations. Especially in the treatment of patients suffering from dental anxiety or phobia, detailed information regarding the specific content of the patient's current dental anxiety or phobia is of great importance. Thus, assessment of a wide range of potentially anxiety-provoking stimuli is highly relevant, both clinically and practically.

Several studies have attempted to identify anxiety-provoking stimuli present in the dental setting. Examples of stimuli studied are receiving an injection (63, 64), having dental X-rays taken (65), the sight of the needle (5, 7, 66-69), various aspects of the drill, such as sight, sound, smell and sensation (2, 5, 70, 71), negative behaviour of the dentist (72-76), pain sensations (5, 77-81) and several other potentially anxiety-evoking aspects present in the dental practice (e.g. the smell, the dental personnel and the chair: see for example, 16, 71, 77, 79, 82-84). The most important limitation of these studies is the fact that they covered only a small part of this highly complex setting. That is, in only five of these studies, more than 12 anxiety-provoking dental stimuli were subject to investigation (16, 66, 71, 81, 85), while 22 stimuli appeared to be the maximum number investigated in one study. A second limitation pertains to the fact that these different studies used a great variability in samples (e.g. students, children, dental patients and general population), samples sizes (range from 19 to 1,437 subjects) and in only six studies the rationale behind the choice of the included stimuli was reported (7, 65, 66, 71, 81, 84). Another frequently encountered limitation is the fact that no clear distinction is made between fear of the conditioned stimulus

(CS: for instance, the drill) and the unconditioned stimulus (UCS: for instance, fainting). That is, the learned and unlearned stimuli are often confused. One example is the item 'the dentist laughs at you when he looks in your mouth' (66), a phrase which contains aspects of both learned and unlearned stimuli. A final limitation of these studies is the fact that in nine of the studies, the Dental Fear Schedule (DFS) (67) was used (5, 7, 67-70, 80, 84, 85). This instrument was originally developed to assess the severity of dental trait anxiety, rather than to identify the potential anxiety-provoking capacity of several stimuli.

In summing up, because of the limitations of the previous studies it is hard to draw any equivocal conclusion regarding the relative anxiety provokingness of the various stimuli present in the dental setting. Thus, there is a clear need for a study investigating whether there is a hierarchy of anxiety-provoking stimuli within the dental setting using a large and complete questionnaire covering all stimuli potentially present in the dental setting.

Aetiology of dental anxiety

An important question concerns the development of dental anxiety. It is widely accepted that there are three pathways along which anxiety can be acquired. These pathways are (a) conditioning, (b) vicarious learning and (c) transmission of information and/or instruction (86, 87). The majority of highly-anxious dental patients report that the onset of their anxiety can be attributed to one or more invasive distressing dental experiences during previous dental treatment (2, 11, 88-90). Examples of these distressing dental experiences are events involving severe pain (e.g. extractions or injections: 2, 11, 67, 71, 82, 88, 89, 91), negative behaviour of dentists (e.g. belittlement of the patient or a rude dentist: 64, 71, 72, 76) and other events in the dental setting causing severe distress (e.g. embarrassment: 2, 71, 92, 93). The

proportion of people ascribing the onset of their anxiety to other ways of acquisition such as vicarious learning or transmission of information appears to be much smaller (11, 87, 91).

Not only distressing dental experiences may facilitate the development of dental anxiety, traumatic events outside the dental setting may also be of influence. Examples of traumatic stressors reported by subjects with pathological forms of dental anxiety are (a) sexual abuse (see for example, 94-96), (b) war trauma (97), (c) severe traffic accidents (98), (d) a tragic death of a loved one (99), (e) a distressing medical experience (89) and (f) physical assault (90, 95).

Systematic research using well-validated instruments in the assessment of the aetiology of dental anxiety and the relative impact of the different types of distressing experiences both inside and outside the dental setting on the development of dental anxiety is lacking at the current time. Such a systematic approach is important in studying risk and resilience factors for the development of long-lasting dental anxiety. Furthermore, as it is not clear whether some experiences are more critical than others in terms of precipitating pathological levels of dental anxiety, it would be challenging to assess the association between distressing events, on the one hand, and the development of pathological levels of dental anxiety, on the other.

Conclusion and structure of this thesis

From the above literature overview, it can be concluded that there is still a lack of knowledge regarding the dynamics of pathological forms of dental anxiety. As stated previously, general aim of the present thesis is to increase knowledge and understanding of the dynamics of pathological forms of dental anxiety.

To accomplish this, five studies will be presented covering the topics discussed above. In *Chapter 2*, the point prevalence of dental fear and phobia relative

to ten other common fears and specific phobias in a large population-based sample are assessed. This is of importance because European data on the prevalence of dental fears and dental phobias is scarce. Additionally, in this chapter, special attention is paid to the severity and the presence of intrusive re-experiencing of eleven different fears.

Because discrepant findings regarding the factor structure of fears have been reported, the purpose of *Chapter 3* was to contribute to the development of a framework describing the structure of common fears. Hereto, the structure of 11 specific fears is subject to a close inspection using both exploratory and confirmatory factor analysis.

The dental setting is a highly complex environment consisting of a broad range of objects and situations. Relatively little is known about the anxiety-provoking capacities of the various aspects of this setting. Therefore, *Chapter 4* is dedicated to the investigation of a wide variety of different objects and situations present in the dental setting and the extent to which these stimuli are capable of provoking anxiety. Another aim is to assess whether there is a hierarchy in the potentially anxiety-provoking stimuli present in the dental setting. In addition, gender, age and differences in anxiety levels are studied. Finally, the number of stimuli needed to obtain full coverage of all people's dental fears will be estimated.

In order to increase understanding of the development of dental anxiety, and to identify those at risk for developing dental anxiety, the Level of Exposure-Dental Experiences Questionnaire (LOE-DEQ) was developed. The aims of *Chapter 5* are to introduce the instrument and to present its psychometric properties. Furthermore, its suitability as an additional instrument in the assessment of dentally-anxious patients will be determined.

Findings from previous research suggest that certain types of experiences may influence the subsequent development of dental anxiety, but, at the present date, no study has examined the psychological impact of exposure to events both inside and

outside the dental setting, and their relationship with present levels of anxiety. More specifically, based on previous research, it is not clear whether some experiences are more critical than others in terms of precipitating dental phobia onset. Therefore, the main purpose of the study presented in *Chapter 6* is to assess which types of events are most closely associated with the development of pathological forms of dental anxiety (i.e. high dental anxiety and dental phobia). Hereto, the association between distressing events, both dentistry-related and general traumatic events (as measured by the LOE-DEQ) and pathological dental anxiety is determined.

In the final chapter (*Chapter 7*) a chapter-by-chapter summary and a general discussion are presented and practical and theoretical implications are put forward.

This thesis is based on five separate publications in peer-reviewed journals: four have been published and one is submitted for publication. As a consequence, some duplication and redundancy in the various chapters is inevitable. In addition, for practical reasons the publications are not presented chronologically. With regard to lay-out and references, the text is largely uniformed and abstracts are removed.

References

1. BERGGREN U. Psychosocial effects associated with dental fear in adult dental patients with avoidance behaviours. *Psychol Health* 1993; **8**: 185-196.
2. DE JONGH A, AARTMAN IHA, BRAND N. Trauma-related phenomena in anxious dental patients. *Community Dent Oral Epidemiol* 2003; **31**: 52-58.
3. VERMAIRE JH, DE JONGH A, AARTMAN IHA. Dental anxiety and quality of life: the effect of dental treatment. *Community Dent Oral Epidemiol* 2008; **36**: 409-416.
4. ARMPFIELD JM, SPENCER AJ, STEWART JF. Dental fear in Australia: who's afraid of the dentist? *Aust Dent J* 2006; **51**: 78-85.
5. DOMOTO PK, WEINSTEIN P, MELNICK S, OHMURA M, UCHIDA H, OHMACHI K, HORI M, OKAZAKI Y, SHIMAMOTO T, MATSUMURA S. Results of a dental fear survey in Japan: implications for dental public health in Asia. *Community Dent Oral Epidemiol* 1988; **16**: 199-201.
6. MENG X, HEFT MW, BRADLEY MM, LANG PJ. Effect of fear on dental utilization behaviors and oral health outcome. *Community Dent Oral Epidemiol* 2007; **35**: 292-301.
7. MILGROM P, COLDWELL SE, GETZ T, WEINSTEIN P, RAMSAY DS. Four dimensions of fear of dental injections. *J Am Dent Assoc* 1997; **128**: 756-766.
8. SOHN W, ISMAIL AI. Regular dental visits and dental anxiety in an adult dentate population. *J Am Dent Assoc* 2005; **136**: 58-66.
9. KENT G. Dental phobias. In: DAVEY GCL, ed. *Phobias - A Handbook of Theory, Research and Treatment*. New York, NY: John Wiley & Sons Ltd, 1997; 107-127.
10. ARMPFIELD JM, STEWART JF, SPENCER AJ. The vicious cycle of dental fear: exploring the interplay between oral health, service utilization and dental fear. *BMC Oral Health* 2007; **7**: 1.
11. BERGGREN U, MEYNERT G. Dental fear and avoidance: causes, symptoms, and consequences. *J Am Dent Assoc* 1984; **109**: 247-251.
12. MOORE R, BRODSGAARD I, ROSENBERG N. The contribution of embarrassment to phobic dental anxiety: a qualitative research study. *BMC Psychiatry* 2004; **4**: 10.
13. BENJAMINS C. *Psychophysiological measurement of dental anxiety*. PhD Thesis. Amsterdam: the Netherlands, University of Amsterdam, 1995.

14. DE JONGH A. *Dental Anxiety: A Cognitive Perspective*. Amsterdam. PhD Thesis. Amsterdam, the Netherlands: Academic Centre of Dentistry Amsterdam (ACTA), 1995.
15. AARTMAN IHA. *Treating highly anxious patients in a dental fear clinic*. PhD Thesis. Amsterdam, the Netherlands: Academic Centre of Dentistry Amsterdam (ACTA), 2000.
16. STOUTHARD MEA. *Fear of dental treatment: development and validation of a questionnaire for research and practise*. PhD Thesis. Amsterdam, the Netherlands: University of Amsterdam, 1989.
17. MOORE R. *The phenomenon of dental fear – studies in clinical diagnosis, measurement and treatment*. PhD Thesis. Århus, Denmark: Royal Dental College, 1991.
18. HAKEBERG M. *Dental anxiety and health – A prevalence study and assessment of treatment outcomes*. PhD Thesis. Goteborg, Sweden: University of Göteborg, 1992.
19. BERGGREN U. *Dental fear and avoidance: a study on etiology, consequences and treatment*. PhD Thesis. Goteborg, Sweden: University of Goteborg, 1984.
20. ABRAHAMSSON KH. *Dental fear and oral health behavior. Studies on psychological health and psychosocial factors*. PhD Thesis. Gotenborg: Gotenborg Univeristy, 2003.
21. WILLUMSEN T. *Treatment of dental phobia: short-time and long-time effects of nitrous oxide sedation, cognitive therapy and applied relaxation*. PhD Thesis. Oslo, Norway: University of Oslo, 1999.
22. American Psychiatric Association (APA). *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR)*. Washington, DC: American Psychiatric Association, 2000.
23. KLINGBERG G, BROBERG AG. Dental fear/anxiety and dental behaviour management problems in children and adolescents: a review of prevalence and concomitant psychological factors. *Int J Pediatr Dent* 2007; **17**: 391-406.
24. MILGROM P, WEINSTEIN P, KLEINKNECHT R, GETZ T. *Treating fearful dental patients: A patient management handbook*, second ed. Seattle, WA: University of Washington Press, 1995.
25. AGRAS S, SYLVESTER D, OLIVEAU D. The epidemiology of common fears and phobia. *Compr Psychiatry* 1969; **10**: 151-156.

26. FISET L, MILGROM P, WEINSTEIN P, MELNICK S. Common fears and their relationship to dental fear and utilization of the dentist. *Anesthesia Progress* 1989; **36**: 258-264.
27. ARMPFIELD JM, SLADE GD, SPENCER AJ. Cognitive vulnerability and dental fear. *BMC Oral Health* 2008; **8**: 2.
28. BAUMEISTER H, HARTER M. Prevalence of mental disorders based on general population surveys. *Soc Psychiatry Psychiatr Epidemiol* 2007; **42**: 537-546.
29. CORAH NL, GALE EN, ILLIG SJ. Assessment of a dental anxiety scale. *J Am Dent Assoc* 1978; **97**: 816-819.
30. SCHUURS AH, HOOGSTRATEN J. Appraisal of dental anxiety and fear questionnaires: a review. *Community Dent Oral Epidemiol* 1993; **21**: 329-339.
31. STINSON FS, DAWSON DA, PATRICIA CHOU S, SMITH S, GOLDSTEIN RB, JUNE RUAN W, GRANT BF. The epidemiology of DSM-IV specific phobia in the USA: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Psychol Med* 2007; **37**: 1047-1059.
32. FREDRIKSON M, ANNAS P, FISCHER H, WIK G. Gender and age differences in the prevalence of specific fears and phobias. *Behav Res Ther* 1996; **34**: 33-39.
33. BOUTER LM, VAN DONGEN MCIM. *Epidemiological research: construction and interpretation* Houten: Bohn Stafleu Van Loghum, 2000.
34. JABLENSKY A. Research methods in psychiatric epidemiology: an overview. *Aust N Z J Psychiatry* 2002; **36**: 297-310.
35. GATCHEL RJ, INGERSOLL BD, BOWMAN L, ROBERTSON MC, WALKER C. The prevalence of dental fear and avoidance: a recent survey study. *J Am Dent Assoc* 1983; **107**: 609-610.
36. HALLSTROM T, HALLING A. Prevalence of dentistry phobia and its relation to missing teeth, alveolar bone loss and dental care habits in an urban community sample. *Acta Psychiatr Scand* 1984; **70**: 438-446.
37. STOUTHARD ME, HOOGSTRATEN J. Prevalence of dental anxiety in the Netherlands. *Community Dent Oral Epidemiol* 1990; **18**: 139-142.
38. LOCKER D, LIDDELL A, BURMAN D. Dental fear and anxiety in an older adult population. *Community Dent Oral Epidemiol* 1991; **19**: 120-124.

39. LIDDELL A, LOCKER D. Gender and age differences in attitudes to dental pain and dental control. *Community Dent Oral Epidemiol* 1997; **25**: 314-318.
40. WOODMANSEY KF. The Prevalence of Dental Anxiety in Patients of a University Dental Clinic. *J Am College Health* 2005; **54**: 59-61.
41. EITNER S, WICHMANN M, PAULSEN A, HOLST S. Dental anxiety – an epidemiological study on its clinical correlation and effects on oral health. *J Oral Rehabil* 2006; **33**: 588-593.
42. ENKLING N, MARWINSKI G, JAEHREN P. Dental anxiety in a representative sample of residents of a large German city. *Clin Oral Investigations* 2006; **10**: 84-91.
43. NICOLAS E, COLLADO V, FAULKS D, BULLIER B, HENNEQUIN M. A national cross-sectional survey of dental anxiety in the French adult population. *BMC Oral Health* 2007; **7**: 12.
44. BOYD JH, RAE DS, THOMPSON JW, BURNS BJ, BOURDON K, LOCKE BZ, REGIER DA. Phobia: prevalence and risk factors. *Soc Psychiatry Psychiatr Epidemiol* 1990; **25**: 314-323.
45. MAGEE WJ, EATON WW, WITTCHEN HU, MCGONAGLE KA, KESSLER RC. Agoraphobia, simple phobia, and social phobia in the National Comorbidity Survey. *Arch Gen Psychiatry* 1996; **53**: 159-168.
46. BEKKER MH, VAN MENS-VERHULST J. Anxiety disorders: sex differences in prevalence, degree, and background, but gender-neutral treatment. *Gen Med* 2007; **4 Suppl B**: S178-193.
47. BIJL RV, VAN ZESSEN G, RAVELLI A, DE RIJK C, LANGENDOEN Y. The Netherlands Mental Health Survey and Incidence Study (NEMESIS): objectives and design. *Soc Psychiatry Psychiatr Epidemiol* 1998; **33**: 581-586.
48. WITTCHEN HU, NELSON CB, LACHNER G. Prevalence of mental disorders and psychosocial impairments in adolescents and young adults. *Psychol Med* 1998; **28**: 109-126.
49. COX BJ, MCWILLIAMS LA, CLARA IP, STEIN MB. The structure of feared situations in a nationally representative sample. *J Anxiety Disord* 2003; **17**: 89-101.
50. LIPSITZ JD, BARLOW DH, MANNUZZA S, HOFMANN SG, FYER AJ. Clinical features of four DSM-IV-specific phobia subtypes. *J Nerv Ment Disord* 2002; **190**: 471-478.

51. CHAPMAN TF. The epidemiology of fears and phobias. In: DAVEY GCL, ed. *Phobias-A Handbook of Theory, Research and Treatment*. Vol. 1. Washington: John Wiley and Sons Ltd., 1997; 415-435.
52. CRASKE MG, BARLOW DH, CLARK DM, CURTIS GC, HILL EM, HIMLE JA, LEE Y-J, LEWIS JA, MCNALLY RJ, ÖST L-G, SALKOVSKIS PM, WARWICK HMC. Specific (simple) phobia. In: WIDIGER TW, FRANCES AJ, PINCUS HA, FIRST MB, ROSS R, DAVIS, W ed. *DSM-IV sourcebook* Vol. 2. Washington, DC: American Psychiatric Association, 1994; 473-506.
53. WOLITZKY-TAYLOR KB, HOROWITZ JD, POWERS MB, TELCH MJ. Psychological approaches in the treatment of specific phobias: A meta-analysis. *Clin Psychol Rev* 2008; **28**: 1021-1037.
54. BECKER ES, RINCK M, TURKE V, KAUSE P, GOODWIN R, NEUMER S, MARGRAF J. Epidemiology of specific phobia subtypes: Findings from the Dresden Mental Health Study. *Eur Psychiatry* 2007; **22**: 69-74.
55. ARRINDELL WA, PICKERSGRILL MJ, MERCKELBACH H, ARDON A, CORNET FC. Phobic dimensions: III. Factor analytic approaches to the study of common phobic fears; an updated review of findings obtained with adult subjects. *Adv Behav Res Ther* 1991; **13**: 73-130.
56. ARRINDELL WA, EISEMANN M, RICHTER J, OEI TP, CABALLO VE, VAN DER ENDE J, SANAVIO E, BAGES N, FELDMAN L, TORRES B, SICA C, IWAWAKI S, EDELMANN RJ, CROZIER WR, FURNHAM A, HUDSON BL, AGUILAR G, ARRINDELL WA, BAGES N, BENTALL R, BRIDGES KR, BUCHANAN A, CABALLO VE, CALVO MG, CANALDA G, CASTRO J, CROZIER WR, DAVIS M, EDELMANN RJ, EISEMANN M, FARRER RJ, FELMAN L, FRINDTE W, FURNHAM A, GARLING T, GASZNER P, GILLHOLM R, GUSTAFSSON M, HANSSON SB, HARRIS P, HATZICHRISTOU C, HUDSON BL, IWAWAKI S, JOHNSTON M, KALLAI J, KASIELKE E, KENARDY J, LEONG CC, LIDDELL A, MONTGOMERY I, OEI TP, PALENZUELA DL, PENNINGTON D, PETER M, PICKERSGILL MJ, RECINOS LA, RICHARDS JC, RICHTER J, RYDEN O, SANAVIO E, SICA C, SIMON MA, SURMAN M, TORRES B, VAN DER ENDE J, ZALDIVAR F. Phobic anxiety in 11 nations. Part I: Dimensional constancy of the five-factor model. *Behav Res Ther* 2003; **41**: 461-479.

57. CURTIS GC, MAGEE WJ, EATON WW, WITTCHEN HU, KESSLER RC. Specific fears and phobias. Epidemiology and classification. *Br J Psychiatry* 1998; **173**: 212-217.
58. LIDDELL A, LOCKER D, BURMAN D. Self-reported fears (FSS-II) of subjects aged 50 years and over. *Behav Res Ther* 1991; **29**: 105-112.
59. MELLON R. A Greek-Language Inventory of Fears: Psychometric Properties and Factor Structure of Self-Reports of Fears on the Hellenic Fear Survey Schedule. *J Psychopathology Behav Assess* 2000; **22**: 123-140.
60. MURIS P, SCHMIDT H, MERCKELBACH H. The structure of specific phobia symptoms among children and adolescents. *Behav Res Ther* 1999; **37**: 863-868.
61. LAST CG, FRANCIS G, STRAUSS CC. Assessing fears in anxiety-disordered children with the revised Fear Survey Schedule for Children. *J Clin Child Psychol* 1989; **18**: 137-141.
62. MURIS P, MERCKELBACH H, MAYER B, PRINS E. How serious are common childhood fears? *Behav Res Ther* 2000; **38**: 217-228.
63. CORAH NL, O'SHEA RM, BISSELL GD. The dentist-patient relationship: perceptions by patients of dentist behavior in relation to satisfaction and anxiety. *J Am Dent Assoc* 1985; **111**: 443-446.
64. SCOTT DS, HIRSCHMAN R, SCHRODER K. Historical antecedents of dental anxiety. *J Am Dent Assoc* 1984; **108**: 42-45.
65. DOEBLING S, ROWE MM. Negative perceptions of dental stimuli and their effects on dental fear. *J Dent Hyg* 2000; **74**: 110-116.
66. GALE EN. Fears of the dental situation. *J Dent Res* 1972; **51**: 964-966.
67. KLEINKNECHT RA, KLEPAC RK, ALEXANDER LD. Origins and characteristics of fear of dentistry. *J Am Dent Assoc* 1973; **86**: 842-848.
68. ERTEN H, AKARSLAN ZZ, BODRUMLU E. Dental fear and anxiety levels of patients attending a dental clinic. *Quintessence Int* 2006; **37**: 304-310.
69. KAUFMAN E, RAND RS, GORDON M, COHEN HS. Dental anxiety and oral health in young Israeli male adults. *Community Dent Health* 1992; **9**: 125-132.
70. HOLTZMAN JM, BERG RG, MANN J, BERKEY DB. The relationship of age and gender to fear and anxiety in response to dental care. *Spec Care Dent* 1997; **17**: 82-87.

71. LIDDELL A, GOSSE V. Characteristics of early unpleasant dental experiences. *J Behav Ther Exp Psychiatry* 1998; **29**: 227-237.
72. ABRAHAMSSON KH, BERGGREN U, HALLBERG L, CARLSSON SG. Dental phobic patients' view of dental anxiety and experiences in dental care: a qualitative study. *Scand J Caring Sci* 2002; **16**: 188-196.
73. MOORE R, BRODSGAARD I, MAO TK, KWAN HW, SHIAU YY, KNUDSEN R. Fear of injections and report of negative dentist behavior among Caucasian American and Taiwanese adults from dental school clinics. *Community Dent Oral Epidemiol* 1996; **24**: 292-295.
74. SCHUURS AH, DUIVENVOORDEN HJ, THODEN VAN VELZEN SK, VERHAGE F. Fear of dental procedures. *Community Dent Health* 1986; **3**: 227-237.
75. SEEMAN K, MOLIN C. Psychopathology, feelings of confinement and helplessness in the dental chair, and relationship to the dentist in patients with disproportionate dental anxiety (DDA). *Acta Psychiatr Scand* 1976; **54**: 81-91.
76. STOUTHARD ME, RIJKSE A, VAN DEN BERG R. [Etiology of the fear of dentistry] [Article in Dutch]. *Ned Tijdschr Tandheelkd* 1992; **99**: 66-68.
77. WOOLGROVE J, CUMBERBATCH G. Dental anxiety and regularity of dental attendance. *J Dent* 1986; **14**: 209-213.
78. MELLOR AC. Dental anxiety and attendance in the North-west of England. *J Dent* 1992; **20**: 207.
79. DE JONGH A, STOUTHARD ME. Anxiety about dental hygienist treatment. *Community Dent Oral Epidemiol* 1993; **21**: 91-95.
80. QUTEISH TAANI DS. Dental anxiety and regularity of dental attendance in younger adults. *J Oral Rehabil* 2002; **29**: 604-608.
81. VAN WIJK AJ, HOOGSTRATEN J. The Fear of Dental Pain questionnaire: construction and validity. *Eur J Oral Sci* 2003; **111**: 12-18.
82. WARDLE J. Fear of dentistry. *Br J Med Psychol* 1982; **55**: 119-126.
83. DE JONGH A, BONGAARTS G, VERMEULE I, VISSER K, DE VOSA P, MAKKES PC. Blood-injury-injection phobia and dental phobia. *Behav Res Ther* 1998; **36**: 971-982.
84. GADBURY-AMYOT CC, WILLIAMS KB. Dental hygiene fear: gender and age differences. *J Contemp Dent Pract* 2000; **1**: 42-59.

85. PERETZ B, EFRAT J. Dental anxiety among young adolescent patients in Israel. *Int J Pediatr Dent* 2000; **10**: 126-132.
86. RACHMAN S. The conditioning theory of fear-acquisition: a critical examination. *Behav Res Ther* 1977; **15**: 375-387.
87. OST LG, HUGDAHL K. Acquisition of blood and dental phobia and anxiety response patterns in clinical patients. *Behav Res Ther* 1985; **23**: 27-34.
88. LOCKER D, LIDDELL A, DEMPSTER L, SHAPIRO D. Age of onset of dental anxiety. *J Dent Res* 1999; **78**: 790-796.
89. LAUTCH H. Dental phobia. *Br J Psychiatry* 1971; **119**: 151-158.
90. DE JONGH A, FRANSEN J, OOSTERINK-WUBBE FMD, AARTMAN IHA. Psychological trauma exposure and trauma symptoms among individuals with high and low levels of dental anxiety. *Eur J Oral Sci* 2006; **114**: 286-292.
91. SHOBEH EJ, BORLAND L. An empirical study of the etiology of dental fears. *J Clin Psychol* 1954; **10**: 171-174.
92. KENT G. Self-efficacious control over reported physiological, cognitive and behavioural symptoms of dental anxiety. *Behav Res Ther* 1987; **25**: 341-347.
93. FREEMAN RE. Dental anxiety: a multifactorial aetiology. *Br Dent J* 1985; **159**: 406-408.
94. LEENERS B, STILLER R, BLOCK E, GORRES G, IMTHURN B, RATH W. Consequences of childhood sexual abuse experiences on dental care. *J Psychosom Res* 2007; **62**: 581.
95. WALKER EA, MILGROM PM, WEINSTEIN P, GETZ T, RICHARDSON R. Assessing abuse and neglect and dental fear in women. *J Am Dent Assoc* 1996; **127**: 485-490.
96. WILLUMSEN T. The impact of childhood sexual abuse on dental fear. *Community Dent Oral Epidemiol* 2004; **32**: 73-79.
97. FRIEDLANDER AH, MILLS MJ, WITTLIN BJ. Dental management considerations for the patient with post-traumatic stress disorder. *Oral Surg Oral Med Oral Pathol* 1987; **63**: 669-673.
98. SMYTH JS. A programme for the treatment of severe dental fear. Report of three cases. *Aust Dent J* 1999; **44**: 275-278.
99. BERGGREN U. General and specific fears in referred and self-referred adult patients with extreme dental anxiety. *Behav Res Ther* 1992; **30**: 395.