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# Prevalence of dental fear and phobia relative to other fear and phobia subtypes

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**Running title: dental fears and phobias**

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## Abstract

The purpose of the present study was to estimate the point prevalence of dental fear and dental phobia relative to ten other common fears and DSM-IV-TR subtypes of specific phobia. Data was also analysed to examine differences with regard to severity, presence of distressing recollections about fear-related events, gender and prevalence across age. Data was obtained by means of a survey in a sample of 1959 Dutch adults aged between 18 and 93 years. Phobias were assessed based on DSM-IV-TR criteria, whereas severity of present fears was assessed using visual analogue scales. Prevalence of dental fear was 24.3% which is less common than fear of snakes (34.8%), heights (30.8%) and physical injuries (27.2%). Dental phobia appeared most common (3.7%), followed by height phobia (3.1%) and spider phobia (2.7%). Fear of dental treatment was associated with female gender, rated as more severe than any other fear, and was most strongly associated with intrusive re-experiencing (49.4%). The findings suggest that dental fear is a remarkably severe and stable condition with a long duration, only declining after the age of 70 years. The high prevalence of dental phobia in The Netherlands is intriguing and warrants replication in other countries.



Keywords: dental fears, dental phobia, prevalence, fears, specific phobias, DSM-IV.



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Fear is an often-studied topic and has received much attention in the literature (1-4). The results of earlier studies show wide variations in prevalence rates of fears, ranging from 7.7% (2) to as high as 58.0% (4). The most frequently reported fears are fears of animals (12.6-39.0%), heights (19.1-30.7%), storms (5.7-21.1%) and flying (6.9-13.2%) (1-4). Most studies found higher prevalence rates for women than for men (3, 4).

Epidemiological studies which examined the point prevalence of dental fear found a prevalence rate of 'fear of dentists' of 19.8% (2) and 13.1% (4). Gender differences were not reported. With regard to the consequences of dental fear it has been found that this fear creates a unique, self-perpetuating cycle (5). That is, fear of dentistry-related objects and situations often leads to a heightened threshold for seeking care for diseased teeth, a deteriorating oral condition and elevated levels of severity of fear, which imposes a further threat to a person's mental health and quality of life (6-8).

Estimates based on survey data indicate that as many as 3-7% of the population suffer from debilitating high levels of dental fear and avoidance (9-12). A review based on two online search engines (PubMed and PsychInfo, see Table 1) shows the results of studies which have attempted to establish an estimate of the prevalence of high levels of dental fear in the general population (9, 13-21). The results are not consistent, largely because of the considerable variability in methods, measures and criteria used (9, 13-21). Another problem relates to employing measures that leave the interpretation of what 'fear' is up to the respondent, making it hard to decide whether or not general concerns or worries should be included in the response (22). A number of studies used the criterion of a score of $\geq$13 or $\geq$15 on the Dental Anxiety Scale, DAS (23). 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 (24). Because no studies have used the performance of such measures as a diagnostic tool for the assessment of excessive, pathological or phobic mental health conditions (i.e., dental phobia) its use for diagnostic purposes on individual or population level is problematic. Moreover, assessments based on specific measures of dental fear pose a problem when comparing its prevalence and severity with that of other types of fears and phobias.

Yet, there is an agreed scientific solution to address these concerns. The most accepted and appropriate way is to use the widely-established systems for classifying mental illnesses, the International Classification of Diseases (ICD-10; (25)) or the Diagnostic and Statistical Manual of Mental Disorders DSM (26). According to the most recent DSM version, the DSM-IV-TR, a person suffers from a mental health condition termed 'specific phobia' when he or she fulfils the following criteria: (i) the fear is elicited by a specific and limited set of stimuli (e.g. snakes, injections etc.), (ii) confrontation with these stimuli results in intense fear and avoidance behavior, (iii) the fear is unreasonable, and (iv) excessive to a degree that it interferes with daily life (26).

Epidemiological studies, which have attempted to estimate the prevalence of specific phobia within the general population, show that this condition is more prevalent than any other group of psychiatric disorders studied, with life-time prevalence rates of around 10% (2, 27-30). The most frequently-reported phobia subtypes are animal phobia (1.1-7.9%), height phobias (0.5-7.5%), enclosed spaces (3.2-4.0%) and lightning/thunder phobia (2.0-2.1%) (2, 31-33).

Up to the present time, only two studies have examined the point prevalence of dental phobia and reported a prevalence rate of 2.4% (31) and 2.1% (32). The latter

study, conducted by FREDRIKSON *et al.* (32), used a randomly-selected sample of about 700 subjects aged 18 to 70 years. Although this study has probably generated the most reliable estimate of dental phobia prevalence in the general population to date, it also has a number of limitations, which need to be acknowledged. Firstly, the sample was limited to one urban area in Sweden (Stockholm). Secondly, the researchers asked their subjects to rate the presence of 'fear of dentists'. This could easily have been misinterpreted by the respondents, as the dentist appears to be one of the least fear-evoking aspects of the dental treatment situation (34). As a matter of fact, in a study aimed to establish a hierarchy of anxiety-provoking capacities of 67 potentially fear evoking dental stimuli, the dentist as a person was ranked 66th and was reported as extremely anxiety-provoking by only 0.3% of those questioned (34). An even more important limitation of the FREDRIKSON *et al.* (32) study is that the screening questionnaire did not contain an explicit question pertaining to the diagnostic criterion of impairment in terms of significant interference of daily functioning. Thus, it would seem that reliable information on the prevalence of dental phobia in the European population is still lacking.

The purpose of the present study was to determine the prevalence of fear and phobia of dental treatment using DSM-IV-TR criteria in a large population sample. These prevalence rates were compared with prevalence rates of 10 other common fears and phobias (i.e. injections, snakes, spiders, thunder, enclosed spaces, physical injuries, darkness, flying, heights and blood). Data was also analysed to examine potential differences with regard to gender, age, and severity of the present fear, as some of these variables have not been examined in depth in previous research. An additional aim pertained to the extent to which one suffers from trauma-related symptoms. A previous

study showed that 43.3% of the individuals with high levels of dental anxiety indicated to suffer from intrusive re-experiencing of earlier events, a key-feature of post-traumatic stress disorder or PTSD (35). Because it has not been investigated whether this is a characteristic of dental fear alone, or also a feature displayed by individuals suffering from other types of common fears, the present study assessed the severity of the present fears also in terms of presence of intrusive recollections of distressing events associated with having that fear.

## Material and Methods

**Assessment** A questionnaire booklet was used containing a number of self-report measures. In the first part, data on demographic variables (i.e., age, gender, marital status and origin) of the participants were gathered. The second part of the questionnaire consisted of questions pertaining to the presence or absence of 11 common fears (i.e., fear of dental treatment, injections, snakes, spiders, thunder, enclosed spaces, physical injuries, darkness, flying, heights and blood). In order to optimize comparison of results, each of the fears, with exception of the fear of blood, was adopted from the earlier study conducted by FREDRIKSON *et al.* (32). When the participants responded in the affirmative to one or more of these fears, they were invited to complete the third part of the questionnaire. This part consisted of the Phobia Checklist, which focused on the question as to whether the present fears met the diagnostic criteria for specific phobia in terms of the DSM-IV-TR (26). Four DSM-IV criteria for specific phobia were used: (i) the sight of the feared object or experiencing the situation evokes an excessive fear response; (ii) the fear is greater than justified; (iii) avoidance or giving up things because of the fear;

(iv) the avoidance of the situation or object causes daily impairment. The first three criteria were adopted from the Swedish study conducted by FREDRIKSON *et al.* (32); the fourth was added into this study in order to achieve a better coverage of the set of DSM-IV-TR criteria. When each of the four criteria was met, a specific phobia subtype was presumed to be present.

In a pilot study, the Phobia Checklist was validated for dental phobia against the Structured Clinical Interview for DSM-IV (SCID; (36)) in a sample of 22 patients with dental phobia and 133 patients without dental phobia. In the validation process, all patients completed the phobia checklist and were assessed using the anxiety disorder section of the SCID. The results revealed excellent sensitivity (proportion of true positives, 0.95) and specificity (proportion of true negatives, 0.99) and an overall hit rate of 97%. Accordingly, the Phobia Checklist was considered a valid screening tool for specific phobias.

One separate question of the third section pertained to the presence of re-experiences of traumatic distressing experiences. Subjects were asked to indicate whether they were bothered by intrusions; that is, re-experiences of a traumatic event related to the specific fear, which were hard to suppress. The last section of the third part of the questionnaire assessed the severity of present fears, using visual analogue scale (VAS) measures with 0 indicating 'no fear at all' and 100 'terrified'. Participants with a SCID based diagnosis of a phobia of dental treatment showed significantly higher scores on the VAS than participants without this specific phobia subtype ($M=81.29$, $SD=15.6$ vs. $M=60.21$, $SD=24.3$; $t(475)=7.05$, $p<.001$), which supports the validity of this measure[1].

[1] More detailed information about the questionnaire as well as information pertaining to its validation can be obtained from the first author.

**Sample** A large sample was taken from the Dutch population, which consists of about 16.3 million people (37). To obtain a geographically diverse sample (e.g. urban as well as rural areas) and sufficient opportunity to complete the questionnaire, locations were selected in advance. All potential participants (n=2968) were travelling by means of public transport (trains and intercity buses) covering tracks between most major cities across the Netherlands (i.e. Den Helder, Meppel, Zwolle, Groningen, Amsterdam, Leiden, Den Haag, Rotterdam, Dordrecht, Roermond, Arnhem, Nijmegen and Vlissingen), or were visitors of a wide range of public places (supermarkets, terraces, parks and shopping malls, etc.) across the Netherlands. Included, were both smaller cities (Roermond, Amersfoort, Gouda, Oosterhout, Drachten, Groningen, Meppel, Zwolle, Emmeloord, Apeldoorn, Zierikzee and Amstelveen) and villages (Bemelen, Leersum, Schelluinen, Drimmelen, Haule, Kiel-Windeweer, Rolde, Albergen, Tollebeek, Stokkum, Nieuwerkerk and Den Hoorn). To include both working and non-working people, participants were approached from 7:00 am to 23:00 pm.

Of the initially 2968 persons approached, 1969 agreed to participate. Seven questionnaires were incomplete and three questionnaires were completed by participants under age 18, leaving 1959 questionnaires for subsequent analyses. Reported reasons for refusal were; being busy with something else (n=346), don’t feel like it (n=281), insufficient command of the Dutch language (n=131), leaving the train or intercity bus in a moment (n=60), being too tired (n=49), age under 18 (n=85), claiming not being scared (n=46) feeling ill (n=2) or forgot reading glasses (n=1).

**Procedure** Potential participants were approached by an advanced graduate student and invited to participate in a study on fears and phobias. After this introduction, participants were invited to complete the questionnaire booklet if they had reached the age of 18 and had sufficient command of the written Dutch language. Verbal informed consent was obtained in all cases. The decision to use face-to-face administration, rather than telephone, mail or internet administration was based on considerations related to coverage properties, accuracy of the screening, response rate and length of the survey/respondent burden (38).

The study was supported by the Academic Centre for Dentistry Amsterdam (ACTA) and approved by the Netherlands Institute for Dental Sciences (IOT).

**Statistical analyses** Chi-square analyses were used to detect gender differences regarding the point prevalence rates of the 11 fears and phobias and intrusive reports of recollections of fear-related events. Also 95% confidence intervals (CI) were calculated. Gender differences in mean severity ratings of different types of fears were tested using Student's t-tests. For these analyses Bonferroni corrections were applied to correct for type I errors (39) using an alpha level of 0.004. The prevalence data of the fears were treated as cross-sectional and were sorted and split into 7 age groups to create separate curves of fear prevalence across age. Differences among age groups in the prevalence of dental fear were assessed using Chi-square analyses. All data was analysed using the Statistical Package for the Social Sciences (SPSS version 15.0 for Windows).

## Results

**Participants** Women represented 49.6% (n=971) of the sample. The age of the participants varied from 18.0-93.0 years (M=35.8, SD=15.5). The marital status of the participants revealed that 25.4% was not involved, 48.6% was married or cohabiting, 20.7% was dating and 5.3% was either divorced or widowed. The distribution of origin showed that 88.1% was Dutch, 2.0% Surinam, 1.3% Turkish, 1.3% Moroccan, 0.9% Antillean, while 6.3% reported another country of origin. These distributions of gender, age, marital status, urbanicity and country of origin adequately reflect the data published on the Dutch population, over 2005 by the Dutch Central Bureau of Statistics in the Netherlands (37). The prevalence rates for marital status and origin are clearly not sufficient to support subgroup analyses.

**Prevalence of fears** Of the 1959 participants in the study, 399 (20.4%) reported no fear at all. Of these people 114 (28.6%) were female and the age varied from 18.0-89.0 years (M=36.1, SD=15.0). At least one fear was reported by 1560 (79.6%) participants. Prevalence rates of the various types of fears ranged from 8.3%-34.8%. Fig 1 shows that fear of dental treatment was present in 24.3% of the individuals. Fear of snakes (34.8%) was the most commonly reported fear, while fears of heights (30.8%) and physical injuries (27.2%) were ranked second and third. Among the least commonly reported fears were thunder (10.0%), blood (9.4%) and darkness (8.3%).

[INSERT FIGURE 1 ABOUT HERE]

**Prevalence of phobias** Of the 1959 participants in the study 102 (11.8%) met all DSM-IV-TR criteria for at least one subtype of specific phobia. Prevalence rates of the various subtypes of specific phobias ranged from 0.6%-3.4%. Fig 1 shows that specific phobia of dental treatment (3.7%) was most prevalent, followed by phobia of heights (3.1%) and spiders (2.7%). Least prevalent were phobias of darkness (0.9%), physical injuries (0.8%) and thunder (0.6%).

**Severity of fears** Table 2 shows that the mean severity ratings for the 11 different fears ranged from 50.3 to 63.4 and that fears of dental treatment, flying and thunder were rated as most severe. Fears of physical injuries, blood and enclosed spaces were reported as least severe.

[INSERT TABLE 2 ABOUT HERE]

**Intrusive reports of recollections of fear-related events** Rates for reports of recollections of fear-related events for the 11 different fears ranged between 5.4% and 49.4%. Table 3 demonstrates that the fear with the highest prevalence rate for intrusive re-experiencing was fear of dental treatment (49.4%). Among individuals suffering from other fears, this symptomatology was much less prevalent (e.g. spiders, flying, and snakes).

[INSERT TABLE 3ABOUT HERE]

**Gender differences** With regard to the prevalence rates of fears, a significant gender difference was found for fear of dental treatment ($p<0.001$). Women reported this fear more often than men. Significant gender differences were also found for fears of injections, snakes, spiders, enclosed spaces, flying, blood, darkness, and thunder (all $ps<0.004$). Each of these fears was reported more frequently by women than by men (see Table 4). No significant gender differences were found with regard to the prevalence of dental phobia, severity ratings of dental fear and intrusive reports of recollections of dental fear-related events (all $ps >0.004$). The only significant gender differences for phobias were found for the prevalence rates of spider phobia and phobia of enclosed spaces. Women reported these phobia subtypes more often than men ($p<0.004$, see Table 4). With regard to the severity of fears, females fearful of spiders rated their fear as more severe than their male counterparts [$t(454)=-4.60$, $p<0.001$] (see Table 2). Finally, two gender differences were found with regard to intrusive reports of recollections of fear-related events: one for fear of thunder and one for fear of snakes (see Table 3).

**Age distribution of fears** The proportion of people reporting a dental fear appeared to differ by age. Dental fear beginning in childhood and adolescence increased in adulthood with the highest prevalence rate reported by adults of age 60 (32.1%), and a sharp decrease into the older age groups. As no significant differences on dental fear prevalence were found among the groups with ages 21-29, 30-39 and 40-49, these were collapsed. Respondents aged between 21-49 years were significantly more likely [305 of 1152, 26.5%; $X^2$ (1)=5.15, $p=0.023$] to report fear of dental treatment than those aged 18-20 years (76 of 369, 20.6%), and aged 70 years and older [5 of 47, 10.6%; $X^2(1)=5.91$,

p=0.015]. Those aged 60-69 years were significantly more likely to report dental fear (32 out of 107, 29.9%) than those aged 18-20 years [76 of 369, 20.6% $X^2(1)=4.10$, p=0.043] and those of 70 years and older [5 of 47, 10.6%; $X^2(1)=6.64$, p=0.010]. The group with ages between 50 and 59 years (n=59) did not differ from any of the other age groups with regard to prevalence of dental fear.

Fig. 2 shows the plots of prevalence across age for the four most prevalent fears (i.e. fear of snakes, physical injuries, heights and dental treatment). From age 21, the distributions of these fears demonstrate comparable patterns across age with a stable or increasing fear curve during adulthood, being maximal at about 60 years, followed by a decline in the older age groups.

[INSERT FIGURE 2 ABOUT HERE]

**Discussion**

The results of this study using a large and representative sample of the Dutch population suggest that, while dental fear is not the most common fear, this fear is more severe, and more strongly associated with intrusive re-experiencing than any of the other fears evaluated. With a prevalence rate of somewhat less than 25%, dental fear ranked fourth with fear of snakes as the most prevalent fear in the general Dutch population followed by the fears of heights and physical injuries. The ranking of these prevalence rates is in line with previous findings in this area, suggesting that the order of the prevalence of fears is relatively robust and stable across populations (3, 4, 40). Also, the finding that dental treatment is a common source of fear is consistent with findings of earlier community

surveys (4, 10-13). One study, which assessed multiple fears among 1019 residents of Seattle, found dental fear to be even the most common fear out of the 10 different fears surveyed. With a prevalence estimate of 22.6% this figure comes close to the one found in the present study (4).

The present study was guided by DSM-IV-TR criteria to establish an estimation of the prevalence of a variety of subtypes of specific phobia in the population. Interestingly, the findings suggest that dental phobia is the most prevalent subtype of specific phobia. The prevalence of 3.7% for dental phobia, based on the DSM-IV-TR criteria applied in this study, parallels prior estimates (ranging from 3.0-5.0%) of the prevalence rate of excessive forms of dental fear in other Western societies, albeit those were based on less stringent criteria (16, 17, 41). Considering this high prevalence rate, it is difficult to understand why in previous epidemiological studies on the prevalence of specific phobias, phobia of dental treatment has seldom been topic of investigation. The most plausible explanation may be that a phobic form of anxiety about dental treatment is generally not considered to be a common mental health condition. It should be noted that the prevalence rates found for dental phobia in the two studies that did include this phobia subtype were generally lower (2.4% and 2.1% respectively) than those in the current study (31, 32). Possibly, this can be attributed to the fact that dental phobia has previously been operationalised as a phobia of ‘the dentist’. As the dentist as a person has been found to be one of the least fear-evoking aspects of the dental treatment situation (34) this may have led to significant underreporting, and consequently underestimation of the incidence of this phobia subtype from these studies.

The relatively high prevalence of dental phobia, as well as the high severity ratings for dental fear in the present study, does raise the question as to what distinguishes dental phobia from other phobia subtypes. One explanation is that, as a consequence of the often long-term avoidance of dental treatment, the (oral) health of an individual is at stake, which not only will eventually lead to pain and distress (42), but also increases the likelihood of potential invasive treatments. This prospect may further reinforce existing avoidance behavior, thereby increasing the deterioration of oral health state, and instigating a vicious cycle of avoidance behavior, anticipatory anxiety and suffering in terms of pain and reduction of quality of life (43). In view of these consequences individuals suffering from dental phobia should be regarded as high-risk patients who need attention and regular dental appointments to decrease the risk of oral heath problems and to improve their quality of life (8).

A possible explanation for the observation that dental fear is of a debilitating severity is that a large proportion of the dentally-anxious individuals suffer from trauma-related sequalae which are less likely to be found in many other subtypes of specific phobia (44). The relatively high prevalence of about 50% of intrusive reports of recollections of dental fear-related events among those suffering from dental fear corroborates previous studies, in which also half of the dentally-anxious people reported to suffer from intrusive memories and avoidance of reminders of past dental events (45). Accordingly, these findings provide strong indications that the dental setting is a potential threat for many people as exposure to distressing or traumatic events, including those involving extreme pain and helplessness, is not unlikely. Such events not only increase the likelihood of developing dental anxiety and dental phobia, but also of evoking

symptomatology typically found in patients suffering from post-traumatic stress disorder, or PTSD (45, 46).

Although the findings on the prevalence rates of the various subtypes of specific phobia are generally consistent with prior US studies with prevalence rates varying from 0.5%-6.1% (2, 3, 47), the rates found in the present study are relatively low (range 0.4%-3.4%) compared with those found in the study conducted by FREDRIKSON *et al*. (1.6-7.5% (32)). These differences may be attributable to several methodological issues as indicated in our introduction. The present results also indicate that women generally report fears more often than men. Analyses of the gender differences regarding the prevalence rates of dental fear, revealed a similar pattern. Although no such statistically significant differences were detected with regard to the prevalence rates of dental phobia, using the stringent Bonferoni corrections that were applied, most trends were in the same, gender-specific direction. To this end, the findings are consistent with the current view on gender differences in anxiety disorders, which predicts that women are both biologically and socially driven to avoid threat more often than men (3, 49), but may also reflect different genetic and environmental risk factors for the development of phobias in women and men (50).

As far as our knowledge goes, no previous study comprehensively examined age differences in dental anxiety across the life span. Even though it is apparent that the prevalence of fears may vary as a function of age, virtually all studies of dental anxiety have been based on restricted age ranges or a limited number of age groups (e.g. young, middle-aged adults and elderly). For example, to determine age differences FREDRIKSON *et al*. (32) used a median-split approach with an average age of 29 years in the younger

group, and of 53 years in the older group. No differences in the prevalence fears between both groups were found. LOCKER & LIDDEL (18), using a sample of the Canadian population employed three age categories (<50, 50-64 and 65+) and found their younger groups to be equally fearful while those aged 75 years and over were found having significantly lower fear scores. These findings suggest that dental anxiety is inversely related to age (18). Yet, the present results show a somewhat different pattern. The picture that emerged was that of heightened dental fear built up in childhood and adolescence until the age of around 21, a fairly stable pattern across the adult life span, a mild increase in the group with ages between 60 and 69 years, followed by a decrease of fear in the older age groups. The latter part of this curve parallels robust decreases in negative affect found in older age that have been documented in other studies (51). These may be explained by general ageing effects such as interference of fear problems with other forms of discomfort, diseases and health problems, which grow with increasing age. In addition, older adults tend to use emotional coping skills acquired over their life span, whereby potentially negative interactions are avoided (52). The overall age-related distribution pattern found in the present study, with periods of increasing and decreasing fear intensity are remarkable and may be explained by cohort effects. However, comparable trends on heightened fear intensity (22) or elevated prevalence rates of specific phobias around the age of 60 years, can also be inferred from the composed data of large-scale epidemiological studies (48). The fact that virtually all fear curves displayed a similar age-related picture may be viewed as support for the reliability of the present findings.

The results of this study should also be seen in the context of its limitations. First, with regard to the data collection, like any other data-gathering method, public transport and public places have limitations in terms of generalisability of data. However, the sample appears generally to be comparable with the general population in terms of gender distribution, age and ethnicity as reported by the Dutch Central Bureau of Statistics (37). Second, the current study used a questionnaire to assess fears and phobias. In view of the sample size, respondent burden, time and logistical constraints involving resources required, clinical interviews are often infeasible. However, the Phobia Checklist for dental treatment phobia used in the present study was directly compared with the Structured Clinical Interview (SCID; (36)) as the 'gold standard', and the results suggest an adequate ability to estimate the population prevalence accurately. Third, the present study relied upon subject's own evaluation of whether or not the fears they experienced were greater than justified or whether they caused daily impairment. The central element of a specific phobia diagnosis in terms of DSM is the criterion that the severity of the fear should significantly interfere with the person's normal functioning. However, the DSM specific phobia algorithm provides no gold standard of fear severity or clear threshold indicating when a fear of an object or situation meets the criteria 'marked', 'persistent', 'excessive' or 'significantly interfering'. This makes it difficult to differentiate a fear from a phobia in clinical situations, particularly because individuals with specific phobias adjust their lifestyle so that they can completely avoid or at least minimize the contact with their phobic stimulus. The variations in the way cases are defined also have the potential to adversely affect estimates of prevalence in epidemiological studies. For example, in the AGRAS *et al.* (2) study, most of the phobias

were classified as mildly disabling, and when phobias were classified as ‘severe’ the prevalence rate dropped from 7.9% to 0.2%.

In conclusion, dental fears and phobias are seemingly familiar, prevalent phenomena which begin in middle childhood and persist into middle and older adulthood. The observations of dental phobia being the most prevalent phobia subtype, and dental fear not only being the most severe fear, but also the fear most strongly associated with re-experiencing, are intriguing and warrant replication in other populations.

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

| Author | Year | Area | N | Sample characteris-tics | Instrument | Gender | Preva-lence | Prevalence by gender | Cut-off score |
|---|---|---|---|---|---|---|---|---|---|
| GATCHEL *et al.* (20) | 1983 | Dallas USA | 105 | Randomly selected sample by random digit dialing | 10 point Dental Anxiety Scale | F 62 M 43 | 11.7% | F 16.4 M 2.8 | Score 8-10 high fear |
| HALLSTROM & HALLING (17) | 1984 | Gothenborg Sweden | 784 | Representative systematic sample | Semi structured interview | F 784 | 4.3% | F 100% | Degree anxiety and avoidance behaviour |
| STOUTHARD & HOOGSTRATEN (16) | 1990 | The Netherlands | 648 | A weekly surveyed panel representative of the Dutch population | Dental Anxiety Questionnaire | F 50.6 M 49.4 | 3.9% | F 64.2% M 35.8% | Stanine 9 (score > 142) |
| LOCKER & LIDDEL (18) | 1991 | Ontario Canada | 580 | Community sample of people age 50 year and over | Dental Anxiety Scale | F 32 M 217 | 7.8% | F 9.4 M 5.1 | >13 |
| LIDDEL & LOCKER (19) | 1997 | Toronto Canada | 2609 | Sample randomly selected from the voters list | Dental Anxiety Scale | F 1481 M 1128 | 10.7% | Not reported | >13 |
| WOODMANSEY (15) | 2005 | USA | 100 | Patients university clinic | Dental Anxiety Scale | Not reported | 4.0% | Not reported | >15 |
| EITNER *et al.*(14) | 2006 | Germany | 374 | Adult male soldiers | Dental Anxiety Scale | M 374 | 4.6 | M 100% | >15 |
| ENKLING *et al.* (13) | 2006 | Bochum, Germany | 300 | Pedestrians | Hierarchical Anxiety Questionnaire (HAQ) | F 48% M 42% | 11% | Not reported | >38 |
| NICOLAS, *et al.* (9) | 2007 | France | 2725 | Convenience sample | Dental Anxiety Scale | Not reported | 7.3% | Not reported | >15 |
| ARMFIELD *et al.* (21) | 2008 | Australia | 3937 | Sample from CATI survey | Global question | F 2052 M 1880 | 3.9% | Not reported | Extremely stressed or afraid (5) |

**Table 2** *Mean Severity Ratings (MSR), ranking of fears and gender differences*

| | Total | | Gender | | |
|---|---|---|---|---|---|
| | | | Men | Women | |
| | N | MSR (SD) | MSR (SD) | MSR (SD) | t |
| Type of fear | | | | | |
| Dental treatment | 477 | 63.35 (24.4) | 60.40 (22.5) | 65.58 (25.5) | -2.31 |
| Flying | 239 | 62.30 (24.4) | 61.19 (26.5) | 62.98 (23.1 | -0.55 |
| Thunder | 196 | 60.23 (20.6) | 55.71 (24.3) | 61.38 (19.4) | -1.56 |
| Snakes [1] | 682 | 60.16 (23.4) | 49.27 (24.7 | 61.27 (23.3) | -4.60 |
| Heights | 604 | 59.39 (22.7) | 57.69 (21.6) | 60.84 (23.4) | -1.70 |
| Spiders | 456 | 58.43 (24.2) | 59.29 (22.9) | 60.64 (23.6) | -.073 |
| Injections | 315 | 57.40 (21.4) | 56.28 (21.8) | 58.00 (21.2) | -0.68 |
| Darkness[2] | 163 | 56.97 (23.1) | 49.39 (24.5) | 58.82 (22.4) | -2.09 |
| Enclosed spaces | 341 | 56.50 (22.8) | 51.24 (20.9) | 58.72 (23.2 | -2.79 |
| Blood | 184 | 53.08 (24.3) | 51.30 (24.1) | 54.20 (24.5) | -.0.79 |
| Physical injuries[2] | 532 | 50.33 (23.7) | 50.51 (23.2) | 50.16 (24.2) | 0.17 |

[1] Using Bonferroni correction, $p<0.004$, significant gender difference (women > men)
[2] Using Bonferroni correction, $p<0.004$, significant gender difference (younger > older)

**Table 3** *Prevalence rates (%), 95% Confidence Intervals (CI), ranking and gender differences in the report of recollections of fear-related events*

| | Total | | | Gender | | |
|---|---|---|---|---|---|---|
| | % | CI | N | Men % | Women % | $\chi^2(1)$ |
| Dental treatment | 49.4 | 49.2 - 49.6 | 235 | 49.3 | 49.4 | 0.01 |
| Thunder | 29.1 | 28.4 - 29.8 | 57 | 30.0 | 28.8 | 0.02 |
| Enclosed spaces | 28.2 | 27.8 - 28.6 | 96 | 23.8 | 30.0 | 1.37 |
| Darkness | 26.5 | 25.6 - 27.4 | 43 | 18.8 | 28.5 | 1.24 |
| Physical injuries[1] | 26.2 | 25.9 - 26.5 | 139 | 33.3 | 19.1 | 13.91 |
| Blood | 21.7 | 20.9 - 22.5 | 40 | 26.8 | 18.6 | 1.71 |
| Injections | 20.6 | 20.1 - 21.1 | 65 | 24.8 | 18.4 | 1.74 |
| Heights | 13.3 | 13.0 - 13.6 | 80 | 14.4 | 12.3 | 0.56 |
| Spiders | 11.4 | 11.0 -11.8 | 52 | 14.8 | 10.3 | 1.63 |
| Flying | 8.8 | 8.1 - 9.5 | 21 | 12.2 | 6.8 | 2.08 |
| Snakes[2] | 5.4 | 5.1 - 5.7 | 37 | 9.1 | 3.4 | 9.78 |

[1] Using Bonferroni correction, $p<0.004$, significant gender difference (women > men)
[2] Using Bonferroni correction, $p<0.004$, significant gender difference (men>women)

**Table 4** *Gender differences in the prevalence of fears and specific phobias*

| | Fears | | | Phobias | | |
|---|---|---|---|---|---|---|
| | men | women | | men | women | |
| | % | % | $\chi^2(1)$ | % | % | $\chi^2(1)$ |
| Snakes[1] | 24.5 | 45.3 | 93.54 | 0.8 | 1.6 | 2.84 |
| Heights | 28.1 | 33.6 | 6.79 | 2.4 | 3.7 | 2.70 |
| Physical injuries | 26.8 | 27.5 | 0.11 | 0.7 | 0.9 | 0.29 |
| Dental treatment[1] | 20.7 | 28.0 | 14.03 | 2.6 | 4.7 | 6.13 |
| Spiders[1 2] | 10.9 | 35.8 | 170.1 | 1.0 | 4.3 | 20.81 |
| Enclosed spaces[1 2] | 10.2 | 24.8 | 72.41 | 0.7 | 2.6 | 10.61 |
| Injections[1] | 11.0 | 21.2 | 37.63 | 0.8 | 1.3 | 1.29 |
| Flying[1] | 9.2 | 15.2 | 16.63 | 1.1 | 2.1 | 2.82 |
| Thunder[1] | 4.0 | 16.1 | 78.55 | 0.3 | 0.8 | 2.37 |
| Blood[1] | 7.2 | 11.6 | 11.40 | 1.1 | 0.9 | 0.17 |
| Darkness[1] | 3.2 | 13.5 | 67.48 | 0.4 | 1.3 | 4.97 |
| $\geq$ 1 fear / $\geq$1 phobia[1 2] | 71.2 | 88.3 | 88.35 | 8.2 | 15.6 | 25.36[1] |

[1] Using Bonferroni correction, $p<0.004$, significant gender difference in fears (women > men)
[2] Using Bonferroni correction, $p<0.004$, significant gender difference in phobias (women > men)

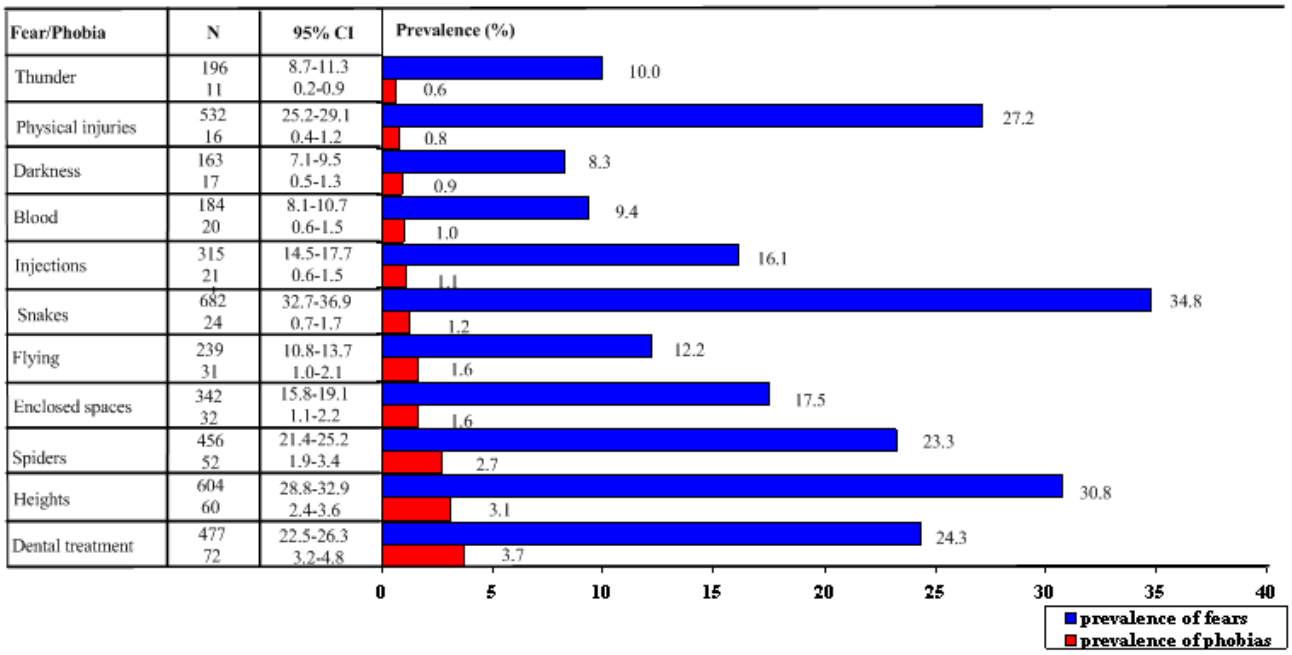


*Fig 1.* Prevalence of fears and phobias

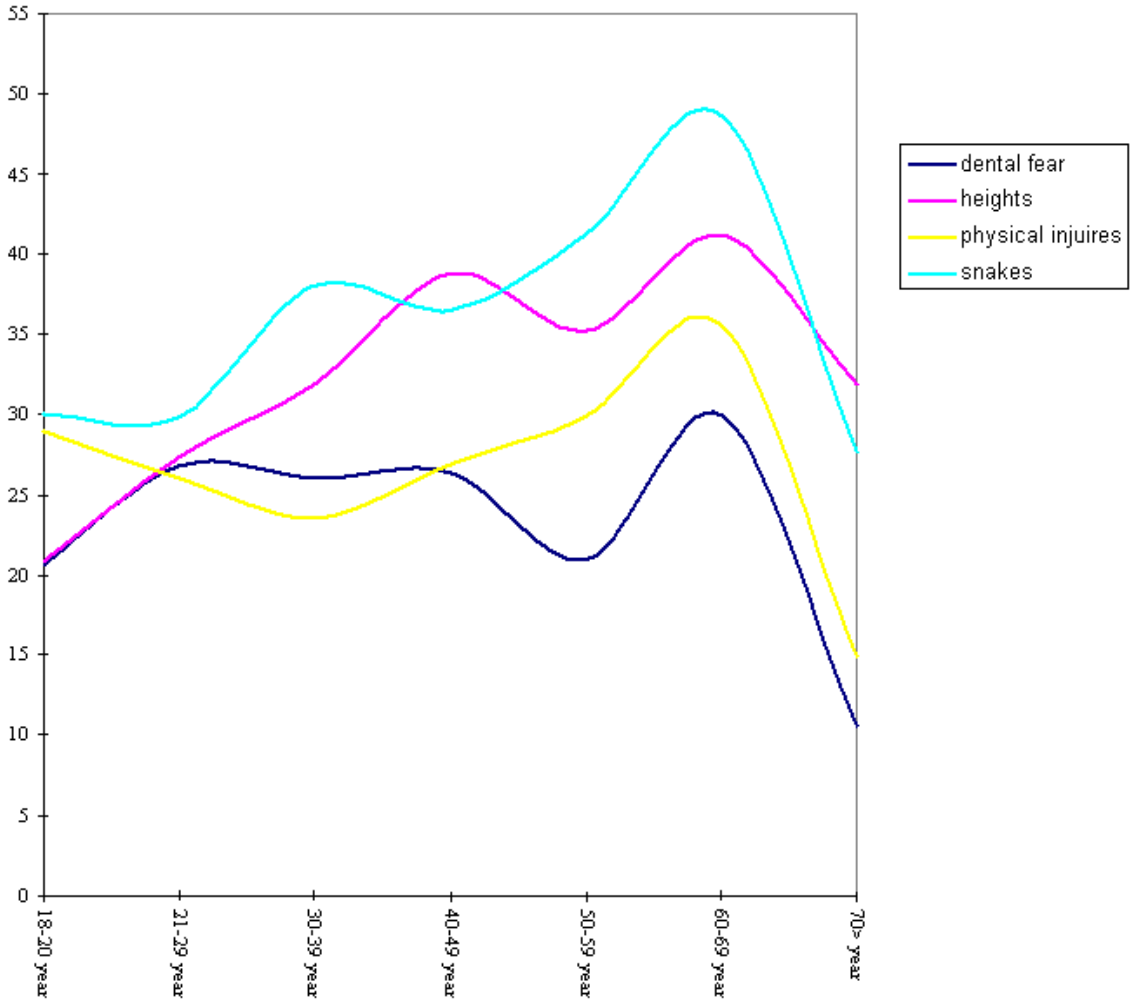


*Fig 2.* Age distribution of the four most prevalent fears