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Title

Changes in dental fear among Finnish adults – a national survey

Running head

Changes in dental fear among Finnish adults

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Abstract

Objectives: The aim of this study was to evaluate changes in dental fear among adult Finns aged 19 years and over at the beginning of the study in 2000 – 2011 in a nationally representative sample. **Methods:** The study was based on Health 2000 and 2011 Surveys by the National Institute for Health and Welfare in Finland. The Health 2000 survey used a stratified two-stage cluster sampling design (N=9,922). Those who participated in 2000 (n=7,964) were invited to participate in 2011. The number of participants was 3,961. Dental fear was assessed by a single question: "How afraid are you of visiting a dentist?" (not at all, somewhat, very much). Background variables included were age (categories 30-34, 35-39, 40-44, 45-54, 55-64, 65-74, 75+ years), gender, marital status (non-single, single) and education (basic, secondary, higher). To match the population sizes in different areas, the data were weighted based on age, gender and area (register data). General linear modelling for repeated measures was used to evaluate changes in dental fear and associations with background variables. **Results:** Between 2000 and 2011 dental fear decreased more often than increased among adults in Finland. Recovering from being very afraid to not at all afraid of visiting a dentist was most common in the oldest group. For most participants, dental fear remained stable; being very afraid of visiting a dentist was more stable among participants from 35 to 54 years of age than among younger or older participants. **Conclusions:** Dental fear seems to depend on age. It is still common, and new persons become fearful in all age groups. As they are likely to meet fearful patients every day, dentists should know how to help patients with dental fear.

Introduction

The prevalence of dental fear among adults has been studied extensively, but few studies have reported longitudinal changes in dental fear (1-5). In particular, nationally representative longitudinal studies are rare.

The prevalence of dental fear varies according to gender and age. In cross-sectional studies women have consistently reported dental fear more often than men (6-28); but according to age, the results were less consistent (6-14,16-18,22,25-32).

In most longitudinal studies, dental fear increased among younger adults and decreased among older adults (1-5). In a 28-year follow-up study among Swedish middle-aged and elderly women, 9% of these women rated themselves as being more fearful and 28% less fearful than at the beginning of the study (4). Among New Zealanders dental fear increased among 14% and decreased among only 2% of the participants between the ages of 15 and 32 (1). Men more often than women belonged to the non- or low-anxiety group. In a five-year study among Canadian adults, dental fear increased most often (12%) in the age group 18-24 years, and increased least often among 65-years or older participants (2%). However, there was no significant difference in dental anxiety between men and women. (2). In a three-year study among 50-year-olds and older in Canada, high dental fear decreased only slightly among men but increased among women (5).

The aim of the present longitudinal study was to evaluate changes in dental fear in a nationally representative sample of adults aged 19 years and over at the beginning of the

study in Finland between the years 2000 and 2011. Gender and age-specific changes were also evaluated.

Materials and methods

This longitudinal 11-year follow-up study was based on nationally representative Health 2000 and 2011 Surveys by the National Institute for Health and Welfare in Finland. The original sample in 2000 consisted of individuals aged 18 and over who were living in Finland. The Health 2000 Survey used a stratified two-stage cluster sampling design with standard probability sampling routines. The sample was stratified geographically according to five University Hospital regions and from each stratum 16 health care districts (clusters) were selected, resulting in a total of 80 clusters. The 15 largest cities in Finland were included in the sample. The rest of the health care districts were selected using systematic probabilities proportional to the size design within each University Hospital region. In the second phase the individuals in the clusters were categorized by age and then selected using systematic sampling. (33). Those who were included in the survey in 2000 were invited to participate in 2011 (34). The sample sizes in different phases of the surveys are presented in Table 1 (33,35). In both surveys, assessment of dental fear and information on marital status and education were asked in an interview. Of the total sample 3,961 subjects answered the dental fear question in 2000 and 2011. According to dental fear in 2000, marital status, gender and education, there were no statistically significant differences between those who did not answer the dental fear question in 2011 and those who did. However, those who were not asked about dental fear (i.e. participants taking part in the home health examination or in the short postal or telephone questionnaires) in 2011, compared to those who were asked, were more likely to be very much afraid of dentists (prevalences 13% vs. 9%), were single (33% vs.

26%) and had basic education (31% vs. 24%) (all p-values <0.001); but there was no difference according to gender.

To match the population sizes in different areas, the individuals in the data were weighted according to age, gender and area (register data).

The independent variable was dental fear; and the background variables included were age, gender, marital status and education. In addition to age and gender, marital status and education were included as in the 2000 study they were associated with being afraid of visiting a dentist (10). Dental fear was assessed by a single question: "How afraid are you of visiting a dentist?" This question has been shown to be a valid and reliable measure of dental fear (36,37). Reply alternatives were "Not at all", "Somewhat" and "Very much". Of the independent variables, age, education and marital status were categorized. Age was categorized as age 30 to 34, 35 to 39, 40 to 44, 45 to 54, 55 to 64, 65 to 74 and 75+ years old according to the age of the participants in 2011. Marital status was categorized into non-single=1 (married or cohabiting) and single=2 (unmarried, divorced, separated or widowed). Education was categorized into three levels: basic, secondary and higher education.

The changes in dental fear among adults according to age and gender were determined in a longitudinal study between the years 2000 and 2011. Dental fear and its changes were evaluated using cross-tabulations. Significances of the changes were evaluated using the Wilcoxon-test. General linear modelling for repeated measures was used to evaluate the changes in dental fear and associations with age, gender, education and marital status. The within subjects variables were dental fears measured in 2000 and 2011. Between-subjects

factors were age, gender, education, marital status and their interactions. Those interaction terms and factors for which $p > 0.05$ were eliminated from the model manually.

Results

Distribution of the participants by age, gender, education, marital status and dental fear is presented in Table 2. In both surveys women more often than men reported being very much afraid, but a majority of these men and women were not afraid of visiting a dentist either in 2000 or in 2011. The prevalence of dental fear was highest at the age of 34 and under, after which it decreased (Table 3).

Changes between genders in terms of dental fear and changes in dental fear among women and men in the separate age cohorts are presented in Table 4. One fifth of those who were very much afraid of visiting a dentist in 2000 had recovered from their fear (i.e. were now not at all afraid), men more often than women. Of those who in 2000 were not at all afraid of visiting a dentist, less than two percent reported being very much afraid in 2011. Of the participants who were somewhat afraid in 2000, about half were somewhat afraid also in 2011. When different age groups are compared, the majority of the participants in the age groups over 35 years remained not at all afraid of visiting a dentist between 2000 and 2011. In the age groups under 75 years about half of the participants who were somewhat afraid of visiting a dentist during the first survey were also somewhat afraid in 2011. Being very much afraid of visiting a dentist was more stable among participants aged 35 to 54 years than among younger or older participants. Recovering from being very much afraid of visiting a dentist was most common in the oldest group. Over two thirds of those aged 75 years or older

had recovered from being very much afraid of visiting a dentist in 2011, while in the other age groups recovery from dental fear varied from 14 to 33 percent.

Age, gender, education and the interaction term between age and gender remained in the final model (GLM for repeated measures). The change in dental fear was statistically significant ($p=0.010$). Even though age ($p<0.001$), gender ($p<0.001$), education ($p=0.002$) and the age-gender interaction ($p=0.003$) were associated with dental fear, they were not statistically significantly associated with changes in dental fear.

Discussion

Dental fear decreased more often than it increased. However, for most participants dental fear remained stable between 2000 and 2011. The changes in being afraid of visiting a dentist were similar among men and women.

The strengths of this study were a valid measure of dental fear (36), large, nationally representative data and long follow-up. The question about dental fear was answered in both years by nearly 4,000 participants. As the majority of drop-outs were due to death and at the moment we do not have data to identify them, the drop-out data were not analysed. However, to analyze which participants chose not to answer questions about dental fear even though they answered other questions, non-response analyses were used instead. In 2000 no differences according to dental fear, marital status, gender or education were observed. On the other hand, participants who took part only in the home health examination or short postal or telephone questionnaires, and thus were not asked the single question about dental fear,

were more often single or had basic education. Participants aged 39 or under and those aged 75 or over as well as those who were very afraid of the dentist in 2000 were overrepresented among those who were not asked the single question about dental fear. It is possible that in the oldest age groups illnesses and disabilities were associated with taking part only in the home examination or short postal or telephone questionnaires. On the other hand, gender was not associated with those who were not asked the single question about dental fear. Similar results for age under 39 and gender among non-responders have been reported earlier (38). The long follow-up period may be one reason for missing values. Taking part only in the home health examination or in the short postal or telephone questionnaires could have impaired the generalizability of the results, which must be taken into account when the results are interpreted.

In this study, participants who were afraid of visiting a dentist were evaluated at two different points in time: in 2000 and in 2011; but how afraid of visiting a dentist they were between these surveys is not known. However, women were more afraid of visiting a dentist than men were, as also reported in earlier studies (6-28); but changes in being afraid of visiting a dentist were similar among men and women. According to this study, dental fear increases most among younger adults and decreases most in older age groups, which confirms earlier results reported for longitudinal studies (1-5). In this study a decrease in dental fear depended on age rather than birth cohort, the highest prevalence of dental fear being about 34 years.

According to cross-sectional studies, the associations between dental fear and marital status or education have been contradictory, and neither factor seems to have strong correlations with dental fear (2,7,10,12,16,17,19,20,22,26,28-31). In this study, results for changes in

dental fear according to marital status were contradictory for gender. Non-single women and single men (17% and 25%) more often became afraid of the dentist than did single women and non-single men (7% and 14%). On the other hand, being very afraid of visiting a dentist was more stable among participants with higher education than among those with secondary and basic education independently of gender. Stability of dental fear has been suggested to be more common in individuals who are also fearful in general (39). It has also been suggested that fear of an aversive situation depends on a person's earlier life experiences and personality factors as well as his/her appraisal of uncontrollability, unpredictability, disgustingness or dangerousness (40). However, the role of these factors in relation to changes in dental fear requires further studies.

In conclusion, being very afraid of visiting a dentist is still quite common in all age groups. In most cases it did not decrease markedly with age even though we have more technical advances in dental treatment, which makes treatment less uncomfortable, and despite the fact that the population has healthier teeth than a few decades ago. In addition, it is still common for young adults to be afraid of visiting a dentist and in all age groups new persons become afraid of visiting a dentist. Dentists must take into account the fact that many of their patients are at least somewhat afraid of visiting a dentist, and dentists need skills and knowledge for treating fearful patients.

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Table 1. Participants in different phases of the study

Year		
2000	Original sample	9.742
	Took part in at least one phase of the study	8.945
	Interviewed at home or in institutions	8.309
	Answered the single question about dental fear	8.174
2011	Sample size (¹ based on Health 2000 Survey sample)	7.964
	Took part in at least one part of the study	5.901
	Of these participants	
	Interviewed (all questions asked)	4.277
	Home health examination ²	452
	Short postal/telephone questionnaire ³	1.172
Answered the single question about dental fear	4.091	
Data	Answered the dental fear question in both years	3.961

¹ Between 2000 – 2011, 1,573 died, 96 moved abroad, and 109 refused to answer, so final sample size was 7,964

² Home health examination did not include the single question about dental fear

³ Short postal/telephone questionnaire did not include the single question about dental fear

Table 2. Description of the study population (numbers and weighted percentages) according to age in 2011, education, marital status and dental fear, separately for men (n=1,760) and women (n=2,201)

Variable	Categories		All	Men		Women	p-value
	Age in 2011	(Age in 2000)	n	%	%	%	
Age	30-34	(19-23)	275	8	8	8	0.681
	35-39	(24-28)	213	6	6	6	
	40-44	(29-33)	402	11	11	11	
	45-54	(34-43)	929	23	23	23	
	55-64	(44-53)	1032	25	26	24	
	65-74	(54-63)	758	17	17	18	
	75+	(64+)	352	10	9	10	
Education	Basic		947	26	26	25	<0.001
	Secondary		1369	35	42	30	
	Higher		1645	39	32	45	
Marital status	Non-single		2944	74	80	69	0.066
	Single		1017	26	20	31	
Dental fear in 2000	Not at all		2412	61	69	54	<0.001
	Somewhat		1209	30	25	35	
	Very much		340	9	6	11	
Dental fear in 2011	Not at all		2647	67	75	60	<0.001
	Somewhat		1078	27	21	32	
	Very much		236	6	4	8	

Table 3. Prevalences (%) of being very much afraid of visiting a dentist (%) in 2000 and in 2011.

Birth year	Age in 2000	Very much afraid in 2000	Age in 2011	Very much afraid in 2011
1977 or later	-23	8.0	-34	8.4
1972-1976	24-28	8.6	35-39	8.1
1967-1971	29-33	10.3	40-44	7.6
1957-1966	34-43	10.8	45-54	7.8
1947-1956	44-53	8.5	55-64	5.2
1937-1946	54-63	7.2	65-74	4.2
1936 and before	64+	5.7	75+	2.2

Table 4. Changes in dental fear (%) among women, men (men n=1,760, women n=2,201) and age cohorts (age in 2011). P-values based on GLM.

Gender	Fear 2000	2011			p-value
		Not at all	Somewhat	Very much	
All	Not at all	85	13	2	<0.001
	Somewhat	42	52	6	
	Very much	23	39	38	
Men	Not at all	88	11	1	<0.001
	Somewhat	47	47	6	
	Very much	32	35	33	
Women	Not at all	82	16	2	<0.001
	Somewhat	39	55	6	
	Very much	19	41	40	
-34	Not at all	76	20	4	0.453
	Somewhat	41	46	13	
	Very much	24	47	29	
35-39	Not at all	83	12	5	0.162
	Somewhat	37	58	5	
	Very much	33	22	45	
40-44	Not at all	81	17	2	0.005
	Somewhat	36	58	6	
	Very much	15	41	44	
45-54	Not at all	83	16	1	<0.001
	Somewhat	39	55	6	
	Very much	14	39	47	
55-64	Not at all	87	12	1	<0.001
	Somewhat	41	54	5	
	Very much	27	39	34	
65-74	Not at all	89	10	1	<0.001
	Somewhat	49	45	6	
	Very much	20	48	32	
75+	Not at all	91	8	1	0.002
	Somewhat	63	35	2	
	Very much	61	17	22	