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Age-specific associations between dental fear and dental condition among adults in Finland

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Abstract

Objective. Our objective was to study whether dental condition, measured by numbers of sound, decayed, missing, and restored teeth, was associated with dental fear, and whether age, dental attendance, and/or gender modified this association. ***Material and Methods.*** The sample ($n = 8{,}028$) comprised Finnish adults aged 30 years and older and the study included people ($n = 6{,}335$) who participated in a home interview and a clinical dental examination. Dental fear was measured by the question: "How afraid are you of visiting a dentist?" Multiple logistic regression analysis was used to determine the association between dental fear and dental condition variables, i.e. numbers of decayed, missing, sound, and restored teeth considering the effects of age, attendance, and gender. ***Results.*** With the exception of number of restored teeth, all dental condition variables were associated with dental fear. The association between dental fear and number of decayed teeth was positive and was independent of age, gender, and attendance. Age modified the association between dental fear and number of missing and sound teeth. Among the oldest age group, the numbers of missing and sound teeth were positively associated with dental fear while being negatively associated among the youngest age group. ***Conclusions.*** People with high dental fear have poorer dental condition than those with lower fear. Neither gender nor dental attendance affects the association between dental fear and dental condition. The associations between dental fear and numbers of missing and sound teeth vary according to year of birth.

Key Words: *Age, decayed teeth, dental attendance, missing teeth, sound teeth*

Introduction

In most large studies of the relationship between dental fear or anxiety and dental health, self-reported indicators of dental health have been used [1–6], and studies in which clinical indicators of oral health [7–14] have been used are often difficult to compare. Generalization of the results can be difficult if the analysis has been limited to people within a narrow age range [9] or to anxious people only [7]. Aspects of fear related to dental treatment, e.g. dental fear, anxiety, or phobia, may have varied [15]. In this article, we use the expression 'dental fear' to cover all these aspects. In some studies, the association between dental fear and dental health has not been adjusted for the simultaneous effects of factors such as age, gender, education, or attendance pattern [7,9,13,14], all of which can have effects on dental fear and dental health.

When dental health is described with DMFT or DMFS, there seems to be no difference between high and low level of dental fear among groups of adults [8,10,12,14]. When the numbers of decayed, restored, and missing teeth are looked at separately, however, differences are found. Adults with a high level of dental fear have more decayed teeth than those with a low level of dental fear [9–14]. The direction and strength of the association between dental fear and number of restored and missing teeth [5,6,8,10–14], as well as the association between dental fear and edentulousness [1,3,8,16], have varied in different studies.

Fear can lead to avoidance of dental care [4,7,12,17] and thereby to negative effects on oral

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health [7,17]. Irregular dental attendance is common among people with dental fear [1–6,16,18]. When adults with a high level of dental fear are compared, regular attenders have better dental health than irregular attenders [11]. Women report dental fear more than men do [1–5,17], and more often use dental services regularly [19,20]. In general, younger people are more likely to report dental fear than older people are [4,10,17]. Even though associations between dental fear and demographic factors such as age have been confirmed in many studies, it is still unclear whether the generally low prevalence of dental fear among older adults is due to a cohort effect or reflects declining fear with increasing age [21]. The relationship between dental fear and dental health is complex and is likely to differ depending on age, gender, and use of dental services.

Our aim was to evaluate whether the clinically examined dental condition, measured by numbers of sound, decayed, missing, and restored teeth, was associated with dental fear in a nationally representative sample of Finnish adults aged 30 years and older. We also investigated whether age, dental attendance pattern, or gender affected this association.

Material and methods

This cross-sectional study is part of the comprehensive nationwide Health 2000 survey carried out in Finland in 2000–2001 by the National Public Health Institute. Permission for the study was given by the ethics committees of the University Hospital Region of Helsinki and Surroundings and the National Public Health Institute. The two-stage stratified cluster sample ($n = 8{,}028$) represented the Finnish population aged 30 years or older. The final sample size was 7,977 and, of these, 6,896 were interviewed in their homes by professional interviewers from the Statistical Centre of Finland. The response rate for interviews was 88%. Detailed information on the sampling method and interview has been published elsewhere [22].

For this study, we selected all those who had participated in both the home interview and the clinical dental examination (80%; $n = 6{,}335$). The clinical examination, which was based on WHO methods [23], was modified to render the data comparable with the previous nationwide survey in 1980 [24]. The clinical oral examinations were conducted by five trained and calibrated teams, each including a dentist and a dental nurse [22]. Diagnoses on dental status covered 32 teeth, and for each tooth one of the following options was recorded: sound, decayed (separately as crown caries only, root caries only, or both whether filled or not), restored (filling or prosthetic crown, but no caries), fractured (with no caries), residual root (separately with or without caries), and missing. To evaluate inter-examiner reliability of the diagnoses, parallel measurements on 269 participants were carried out during data collection. Inter-examiner kappa value for these diagnoses by tooth was 0.87 (95% CI 0.84–0.89). For this study, we described participants' dental condition as numbers of sound teeth, decayed teeth (including fractured teeth), restored teeth (without caries), and missing teeth (including residual roots).

In the interview, dental fear was determined by a single question: "How afraid are you of visiting a dentist?" The response options ("Not at all", "Somewhat", and "Very") were first used as such. Later, the options "Not at all" and "Somewhat" were combined within one category indicating low or no fear; "Very" was used as the category of high fear. Regularity of dental attendance was determined by the question: "Do you usually visit a dentist?" There were three response options, of which "Regularly for check-up" indicated "Regular attendance"; "Only when I have pain or other problems" and "Never" were combined to indicate "Irregular attendance". The regularity of dental visits was also determined by the questions: "How many times during the past 12 months have you visited a dentist?" and "When did you last visit a dentist?" The replies to these questions correlated strongly with each other. The first question described best the regularity of attendance among the entire study group [4] and was thus chosen for use in further analyses.

For the present study, each participant's background was described by age and gender. Age was rounded to the nearest full year and was categorized into age groups 30–34, 35–44, 45–54, 55—64, and 65+ based on the observed age-specific percentages of people with dental fear. The purpose was to form age groups in which the prevalence of dental fear would vary. The categorization also reflected history of provision of dental services for different age groups in Finland during recent decades [4].

Statistics

Primary analyses included age-specific comparisons of mean numbers of sound, decayed, missing, and restored teeth among three levels of dental fear and by regularity of dental attendance. Because distributions of the numbers of sound, decayed, restored, and missing teeth were not normal, the Kruskal-Wallis and Mann-Whitney tests were used to evaluate the statistical significances of the differences in dental condition between participants with different levels of dental fear and between regular and irregular attenders. The statistical significance of the difference in prevalence of dental fear between dentate and edentulous participants was evaluated with chi-square tests.

Multiple logistic regression analyses were used to evaluate the association between dental fear (very afraid = 1, somewhat or not at all afraid = 0) and

dental condition controlling for age group, gender (0 = man, 1 = woman), and regularity of dental attendance (0 = regular, 1 = irregular). The oldest group was used as the reference. After checking for collinearity between the numbers of sound, decayed, missing, and restored teeth, they were entered in the multiple logistic regression analysis and used as discrete variables.

The first model included all independent variables and their first-order interactions with age, gender, and regularity of attendance. The manual backward elimination method was used to exclude the interaction terms and the main effects for which the coefficient did not reach statistical significance at the $p < 0.05$ level or were not part of a significant interaction term. As the model included significant interaction terms, the main effects that were parts of these interaction terms were kept in the model for calculating the odds ratio (OR). Age-specific graphs were used to present and visualize the ORs of having high dental fear and different numbers of decayed and/or missing teeth, the odds of being very afraid and having Ω decayed or missing teeth in relation to the corresponding odds of having Ω-x decayed or missing teeth, where Ω may be any number of decayed or missing teeth and x any chosen difference in the number of decayed or missing teeth. The aim was to obtain a model that fitted sufficiently well. To take into account the two-stage cluster sampling, statistical methods for handling correlated data with unequal sampling probabilities were used. The parameter estimates and their confidence intervals were adjusted using the svytab and svylogit procedures of Stata, version 8.0 [25].

Results

The distribution of participants according to age, gender, dental fear, and dentate status is presented in Table I. The percentages very afraid of visiting a dentist were higher among women and younger age groups than among men and older age groups. The percentages of edentulous participants were higher among women and older age groups than among men and younger age groups. More than 9% of the participants had high dental fear and about 13% were edentulous.

Those who had poor dental condition more often reported high dental fear than did those with good dental condition (Table II). The highest mean number of decayed teeth in all age groups was among those who were very afraid of visiting a dentist. In all except the 30–34 age group, the mean number of restored teeth was lowest and of missing teeth highest among those who were very afraid of visiting a dentist. The mean number of sound teeth differed according to dental fear status only among the age group 30–34, and was lower among the group who reported high dental fear than among the group reporting low fear.

Women had fewer decayed and more restored and missing teeth than men had, but among both men and women those who had better dental condition reported lower dental fear than did those with poorer dental condition. Among those with high dental fear, the age-specific mean numbers of decayed teeth ranged from 2.1 to 6.0 for men and from 1.0 to 1.5 for women, being highest in the age group 55–64; of restored teeth from 3.9 to 12.1 for men and from 2.7 to 14.6 for women; and of missing teeth from 6.7 to 25.3 for men and from 5.4 to 29.1 for women. The lowest mean number of restored teeth and the highest mean number of missing teeth were observed among the oldest age group. In the two oldest groups, edentulous participants more frequently reported high dental fear than dentate participants: 14% vs 7% ($p = 0.003$) among the age group 55–64 and 8% vs 5% ($p = 0.02$) among the age group 65+, respectively.

The mean numbers of decayed and missing teeth were higher and of restored teeth lower among irregular attenders with high dental fear than among regular attenders with high fear (Table III). The mean number of decayed teeth was higher among the irregular attenders who were very afraid than among those who were somewhat or not at all afraid of visiting a dentist. The mean number of decayed, missing, and restored teeth was almost the same among regular attenders with high and low dental fear.

Table I. Distribution of participants according to age, gender, dental fear, and dentate status among adults aged 30 years and older in Finland.

		Not at all afraid %	Some what afraid %	Very afraid %	Edentulous %	All *n*
Gender	Men	70.9	22.9	6.2	10.2	2869
	Women	56.5	31.1	12.4	15.6	3466
Age	30–34	52.9	33.7	13.3	0.0	694
	35–44	55.7	33.5	10.8	0.3	1454
	45–54	60.6	29.1	10.3	6.1	1624
	55–64	67.6	24.1	8.2	15.7	1103
	65+	77.6	16.5	5.9	42.6	1460
All		63.4	27.1	9.4	13.2	6335

Table II. Age-specific mean numbers of sound, decayed, missing, and restored teeth (95% CI) among adults aged 30 years and older in Finland according to reported level of dental fear.

			Fear[1]					
Age group	Mean (total)		Not at all		Somewhat		Very much	
Sound teeth[2] ($n=5{,}502$)								
30–34	16.9	(16.5–17.3)	17.2	(16.6–17.8)	16.9	(16.2–17.6)	15.7	(14.6–16.7)
35–44	11.3	(11.0–11.7)	11.3 n.s.	(10.8–11.7)	11.5 n.s.	(11.0–12.1)	11.1 n.s.	(10.3–11.9)
45–54	8.2	(7.9–8.5)	8.3 n.s.	(7.8–8.7)	8.1 n.s.	(7.6–8.7)	7.9 n.s.	(7.0–8.8)
55–64	6.9	(6.6–7.3)	7.1 n.s.	(6.8–7.5)	6.6 n.s.	(5.9–7.3)	6.0 n.s.	(4.8–7.1)
65+	5.3	(4.9–5.6)	5.4 n.s.	(5.0–5.7)	5.2 n.s.	(4.5–5.8)	4.9 n.s.	(3.1–6.7)
Decayed teeth[2] ($n=5{,}502$)								
30–34	0.8	(0.7–0.9)	0.8	(0.6–1.0)	0.6	(0.4–0.8)	1.4	(1.0–1.9)
35–44	0.9	(0.8–1.1)	0.9	(0.7–1.0)	0.9	(0.7–1.0)	1.4	(1.0–1.7)
45–54	1.2	(1.0–1.3)	1.1	(1.1–1.3)	1.0	(0.8–1.2)	2.0	(1.5–2.5)
55–64	1.0	(0.9–1.1)	1.0	(0.8–1.1)	0.7	(0.5–0.8)	2.4	(1.3–3.4)
65+	1.2	(1.1–1.4)	1.2 n.s.	(1.0–1.3)	1.2 n.s.	(0.9–1.5)	2.1 n.s	(1.2–3.0)
Restored teeth[2] ($n=5{,}502$)								
30–34	10.6	(10.2–11.0)	10.3 n.s.	(9.7–10.9)	10.9 n.s.	(10.2–11.5)	11.2 n.s.	(10.1–12.2)
35–44	14.9	(14.6–15.2)	15.2	(14.8–15.6)	14.7	(14.1–15.2)	13.8	(13.0–14.7)
45–54	13.3	(12.9–13.7)	13.7	(13.2–14.2)	12.9	(12.1–13.7)	11.6	(10.5–12.7)
55–64	11.1	(10.7–11.6)	11.5 n.s.	(11.0–12.0)	10.8 n.s.	(9.8–11.6)	9.4 n.s	(7.6–11.2)
65+	9.1	(8.5–9.6)	9.6	(9.0–10.2)	8.7	(7.7–9.7)	3.1	(1.9–4.3)
Missing teeth[3] ($n=6{,}335$)								
30–34	3.7	(3.5–3.9)	3.8 n.s.	(3.5–4.0)	3.6 n.s.	(3.4–3.9)	3.8 n.s.	(3.4–4.2)
35–44	5.0	(4.7–5.2)	4.8	(4.5–5.2)	5.0	(4.7–5.3)	5.8	(5.2–6.4)
45–54	10.9	(10.3–11.4)	10.4	(9.8–11.0)	11.2	(10.3–12.2)	12.4	(10.6–14.1)
55–64	16.1	(15.4–16.8)	15.6	(14.8–16.4)	16.2	(14.9–17.5)	19.5	(17.2–21.7)
65+	23.0	(22.5–23.7)	22.8	(22.1–23.5)	22.2	(20.9–23.5)	27.9	(26.5–29.2)

[1]According to Kruskal-Wallis tests, all differences between the three levels of dental fear, except those marked n.s., were statistically significant at the $p<0.05$ level.
[2]Including dentate participants (having at least one tooth).
[3]Including dentate and edentulous participants.

According to the logistic regression analysis (Table IV), all dental condition variables except number of restored teeth were associated with dental fear. The association between dental fear and number of decayed teeth was independent of age, gender, and dental attendance. Figure 1 is a graph giving the OR of having high dental fear and different numbers of decayed teeth (odds of being very afraid and having Ω decayed teeth in relation to the corresponding odds for those having Ω-*x* decayed teeth). The highest number of decayed teeth among the participants was 24. Those who had more decayed teeth were more likely to be very afraid of visiting a dentist than those who had fewer decayed teeth. For example, the OR of having high dental fear and five decayed teeth was almost twice that of having high fear and one decayed tooth (Figure 1). As no statistically significant coefficients for interactions were observed, neither attendance nor gender modified the association between dental fear and dental condition. Irregular attenders (OR 2.6, 95% CI 2.1–3.3) and women (OR 3.0, 95% CI 2.5–3.7) were more likely to be very afraid of visiting a dentist than regular attenders and men were.

Figure 2 presents age-specific graphs describing the OR of having high dental fear and different numbers of missing teeth (odds of being very afraid for those with Ω missing teeth in relation to the corresponding odds for those with Ω-*x* missing teeth; range 1–32). Age modified the association between dental fear and number of missing teeth. Among the age group 30–34, those who had more teeth missing were less likely to be very afraid of visiting a dentist than those who had fewer teeth missing. For example, the OR of having high dental fear and 10 missing teeth was half that of having high fear and 5 missing teeth. Among the age groups 35–44 and 65+, those who had more teeth missing were more likely to be very afraid of visiting a dentist than were those who had fewer teeth missing. Among age group 65+, for example, the OR of having high dental fear and 10 missing teeth was twice that of having high fear and 5 missing teeth. In the age groups 45–54 and 55–64, the number of missing teeth was associated only slightly with dental fear.

The association between dental fear and number of sound teeth was also modified by age. Among age groups 30–34 and 55–64, those who had more sound teeth were less likely to be very afraid of visiting a dentist than were those who had fewer sound teeth. In age group 30–34, the ORs (95% CI) of having high dental fear and differences (Ω-*x*) of 1, 5, and 10 in number of sound teeth were 0.9 (0.9–1.0), 0.7 (0.6–0.9), and 0.6 (0.3–0.9), respectively. In the other age groups, the adults who had more sound

Table III. Age-specific mean numbers of sound, decayed, missing, and restored teeth (95% CI) among adults aged 30 years and older in Finland according to reported dental fear and regularity of dental attendance.

	Very afraid				Somewhat or not at all afraid			
Age group	Regular attendance[1]		Irregular attendance[1]		Regular attendance[1]		Irregular attendance[1]	
Sound teeth[2] ($n=5{,}502$)								
30–34	14.8 [n.s.]	(13.1–16.5)	16.2 [n.s.]	(15.0–17.4)	17.0 [n.s.]	(16.4–17.6)	17.2 [n.s.]	(16.5–17.9)
35–44	11.1 [n.s.]	(9.6–12.6)	11.3 [n.s.]	(10.0–12.7)	11.2 [n.s.]	(10.8–11.6)	11.7 [n.s.]	(11.0–12.3)
45–54	8.2 [n.s.]	(6.8–9.6)	7.9 [n.s.]	(6.7–9.2)	8.2 [n.s.]	(7.8–8.6)	8.4 [n.s.]	(7.8–9.0)
55–64	8.0	(5.8–10.2)	4.9	(3.8–6.0)	7.1	(6.7–7.6)	6.8	(6.1–7.4)
65+	0.9 [n.s.]	(0.1–1.7)	5.8 [n.s.]	(3.8–7.7)	5.8	(5.4–6.3)	4.9	(4.4–5.3)
Decayed teeth[2] ($n=5{,}502$)								
30–34	0.5	(0.2–0.9)	2.2	(1.4–3.1)	0.3	(0.2–0.4)	1.3	(0.9–1.7)
35–44	0.4	(0.2–0.7)	2.1	(1.5–2.7)	0.4	(0.4–0.5)	1.7	(1.4–2.0)
45–54	0.9	(0.1–1.7)	2.6	(1.9–2.2)	0.5	(0.4–0.6)	2.0	(1.8–2.3)
55–64	0.6	(0.2–0.9)	3.0	(1.5–4.5)	0.6	(0.5–0.7)	1.5	(1.2–1.7)
65+	0.0 [n.s.]	(0.0–0.0)	2.4 [n.s.]	(1.3–3.4)	0.7	(0.6–0.9)	1.7	(1.4–1.9)
Restored teeth[2] ($n=5{,}502$)								
30–34	13.0	(11.3–14.7)	9.8	(8.7–11.0)	10.9 [n.s.]	(10.3–11.4)	10.1 [n.s.]	(9.4–10.7)
35–44	15.6	(14.1–17.0)	12.3	(11.0–13.6)	15.9	(15.5–16.3)	13.4	(12.8–14.1)
45–54	15.9	(14.3–17.6)	9.5	(8.1–10.8)	15.8	(15.4–16.3)	9.7	(9.1–10.3)
55–64	15.4	(13.1–17.7)	7.0	(5.1–9.0)	13.6	(13.1–14.2)	7.2	(6.5–8.0)
65+	10.2	(8.2–12.3)	2.5	(1.4–3.5)	13.0	(12.4–13.6)	5.7	(5.1–6.3)
Missing teeth[3] ($n=6{,}335$)								
30–34	3.7 [n.s.]	(3.1–4.2)	3.9 [n.s.]	(3.3–4.5)	3.8	(3.6–4.0)	3.6	(3.3–3.9)
35–44	4.9 [n.s.]	(4.2–5.5)	6.5 [n.s.]	(5.6–7.5)	4.5	(4.2–4.7)	5.4	(4.9–5.9)
45–54	7.1	(5.7–8.8)	12.7	(11.0–14.4)	7.5	(7.1–8.0)	12.3	(11.4–13.1)
55–64	8.1	(6.1–10.1)	18.3	(15.9–20.1)	10.6	(10.1–11.3)	16.9	(15.8–16.0)
65+	20.9 [n.s.]	(18.1–23.7)	22.9 [n.s.]	(20.7–25.2)	12.3	(11.7–13.2)	20.3	(19.5–21.1)

[1]According to Mann-Whitney tests, all differences between regular and irregular attenders, except those marked n.s., were statistically significant at the $p<0.05$ level.
[2]Including dentate participants (having at least one tooth).
[3]Including dentate and edentulous participants.

Table IV. Summary of findings of the final logistic regression analysis[1] on the association between dental fear and dental condition among adults in Finland ($n=6{,}335$[2]). Dental fear was the dependent variable (somewhat or not at all afraid = 0, very afraid = 1).

	OR	Beta	SE	*p*
Intercept		−8.636	1.175	<0.001
Dental attendance (regular = 0, irregular = 1)	2.6	0.966	0.106	<0.001
Gender (men = 0, women = 1)	3.0	1.104	0.105	<0.001
No. of decayed teeth[3]	1.1[5]	0.113	0.020	<0.001
No. of sound teeth[3]		0.196	0.074	0.008
No. of missing teeth[3]		0.153	0.038	<0.001
Age 30–34[4]		6.802	1.216	<0.001
Age 35–44[4]		4.890	1.215	<0.001
Age 45–54[4]		4.924	1.199	<0.001
Age 55–64[4]		4.784	1.256	<0.001
No. of sound teeth × Age 30–34		−0.255	0.071	0.023
No. of sound teeth × Age 35–44		−0.174	0.076	0.023
No. of sound teeth × Age 45–54		−0.177	0.076	0.020
No. of sound teeth × Age 55–64		−0.209	0.082	0.011
No. of missing teeth × Age 30–34		−0.234	0.067	0.001
No. of missing teeth × Age 35–44		−0.118	0.045	0.008
No. of missing teeth × Age 45–54		−0.145	0.040	<0.001
No. of missing teeth × Age 55–64		−0.146	0.042	0.001

[1]Goodness-of-fit test $F_{(17,2134)}=19.87$, $p<0.001$.
[2]Including dentate and edentulous participants (the information for sound, decayed, and restored teeth was coded missing for edentulous participants).
[3]Numbers of sound, decayed, missing, and restored teeth were used as discrete variables.
[4]Age was categorized in 5 groups and 65+-year-olds was used as the reference group.
[5]OR for difference of one decayed tooth.

teeth were more likely to be very afraid of visiting a dentist than were those who had fewer sound teeth. This association was strongest among age group 65+, in whom the ORs (95% CI) of having high dental fear and differences (Ω-*x*) of 1, 5, and 10 in the number of sound teeth were 1.2 (1.1–1.4), 2.7 (1.3–5.5), and 7.1 (1.7–30.6), respectively.

Discussion

In this secondary analysis of the nationally representative data, we found that people with high dental fear had poorer dental condition than those with lower fear. The associations between dental fear and numbers of missing and sound teeth were modified by age, while the positive association between dental

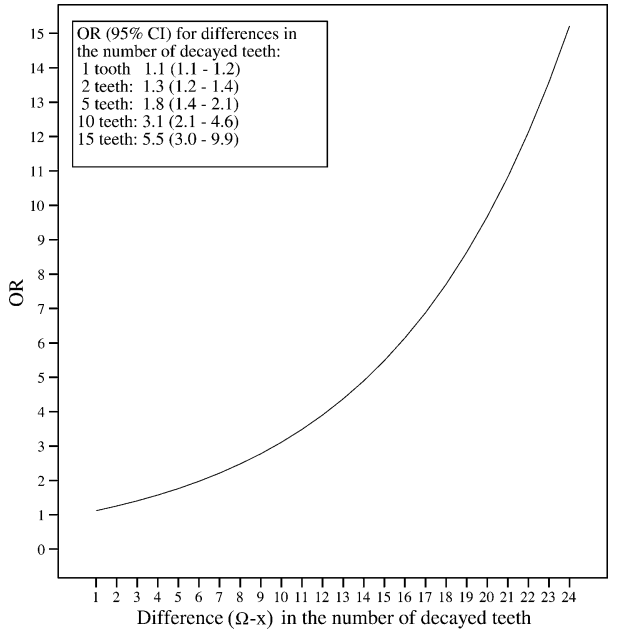

Figure 1. The odds ratio (OR) of having high dental fear and different numbers of decayed teeth (odds of being very afraid and having Ω decayed teeth in relation to the corresponding odds of having Ω-*x* decayed teeth, where Ω may be any number of decayed teeth (1–24) and *x* any chosen difference in the number of decayed teeth).

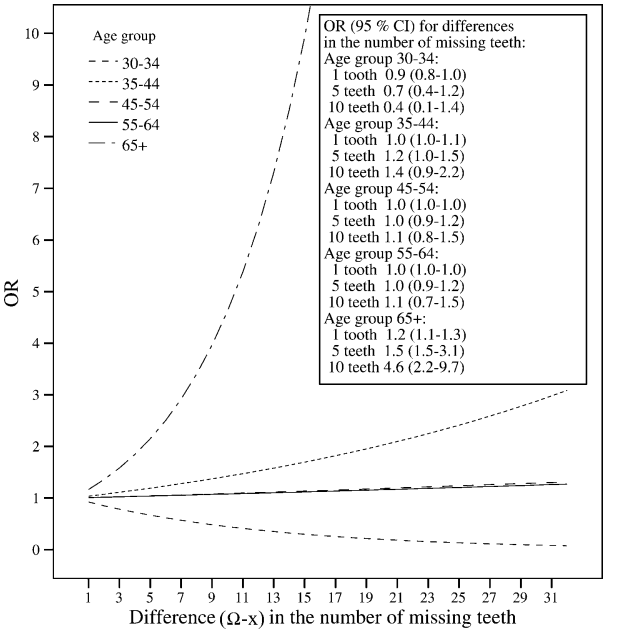

Figure 2. The odds ratio (OR) of having high dental fear and different numbers of missing teeth (odds of being very afraid and having Ω missing teeth in relation to the corresponding odds of having Ω-*x* missing teeth, where Ω may be any number of missing teeth (1–32) and *x* any chosen difference in the number of missing teeth).

fear and number of decayed teeth was independent of age, gender, and dental attendance. Owing to the large nationally representative sample and high rates of participation in both the home interview and the clinical examination, the findings of this study can be generalized to the adult Finnish population aged 30 years and older.

In measuring dental fear we used a single item that has shown to be valid and reliable in the adult Finnish and Norwegian populations [26,27]. Dental fear was ascertained during a home interview, when estimation of dental fear might be more valid than when ascertained in connection with a clinical examination, which those with high fear might not participate in. In this study, we used numbers of decayed, missing, and restored teeth separately, instead of DMFT. In previous studies among adults, dental fear and DMFT or DMFS seem not to be associated [8,10,12,13]. DMFT or DMFS might not be useful measures for studying the associations between dental fear and dental condition among adults because these cumulative indices combine the signs of current treatment need and previous treatments, such as restorations and extractions, which may have different effects on dental fear.

Our findings confirm earlier studies, i.e. adults who are very afraid are more likely to have higher mean numbers of decayed [9,11–13] and missing teeth [8,11,12,14] and a lower mean number of restored teeth [8,10–12] than those who are less afraid of visiting a dentist. According to the multivariable analyses made in this study, those who had more decayed teeth were more likely to have high dental fear than those with fewer decayed teeth. As the number of decayed teeth describes the present treatment need, these findings suggest that people who are very afraid of visiting a dentist might avoid or have difficulty completing their dental care, which in turn may lead to more frequent use of emergency care [8].

The association between dental fear and number of missing teeth varied considerably in relation to age in this cross-sectional study. Number of missing teeth describes the outcome of previous dental care. Traumatic dental experiences have been suggested as causing dental fear [16,17,28] and an extraction could be considered a psychologically traumatic experience. In this study, a positive association between number of missing teeth and dental fear was found only among the oldest age group. Those with more extracted teeth were much more likely to be afraid of visiting a dentist than those with fewer extracted teeth. Among the youngest age group, the association between number of missing teeth and dental fear was negative. It is still unclear whether dental fear changes with increasing age [21]. It has been shown, however, that psychological well-being does not change with increasing age and that age differences are merely due to cohort effects [29,30]. Because this is a cross-sectional study, no causal interpretations can be made. The difference in the direction and strength of the association between dental fear and dental condition among generations might reflect differences between birth cohorts in terms of the history of the provision, content, and quality of oral health services in Finland.

In Finland, the youngest group in this study has received free preventively orientated dental care up to the age of 19 years and subsidized dental care after that. As we have previously suggested [4], this preventively orientated dental care might have helped them to maintain good dental health, or preventive measures and regular check-ups may have worked as latent inhibition of fear [28] and reduced dental fear. For age groups 35+, dental care was restoratively orientated when these people attended school and most had no subsidy for dental care after secondary school. For the older groups, extraction, often several at the same time, was a common treatment pattern.

In conclusion, our findings from a study using a nationally representative sample and clinical indicators of dental condition confirm previous findings concerning the association between dental fear and dental health. Adults with high dental fear have poorer dental condition than those with lower fear. Neither gender nor dental attendance affects the association between dental fear and dental condition. The associations between dental fear and numbers of missing and sound teeth vary according to year of birth.

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