

ORIGINAL ARTICLE

Dental fear and oral health habits among adults in Finland

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Abstract

Objective. The aim of our study was to evaluate the association between dental fear and oral health habits (tooth-brushing, use of toothpaste, dental floss and toothpicks, smoking and dental attendance), while simultaneously considering the effect of age, gender, and attained level of education. **Material and methods.** The nationwide two-stage stratified cluster sample ($n=8028$) was representative of Finnish adults aged 30 years and older. The response rate was 88%. Dental fear was determined by the question: “How afraid are you of visiting a dentist?” Multiple logistic regression analyses were used to determine the association between dental fear and oral health habits, including age, gender, and attained level of education. **Results.** Regular smokers were more likely to be very afraid of visiting a dentist than were those who smoked occasionally or not at all. Age modified the effect of dental attendance and tooth-brushing on dental fear. Among 65+-year-olds, those who brushed their teeth less than twice a day were more likely to be very afraid of visiting a dentist than were those who brushed at least twice a day. Irregular attenders were more likely to be very afraid of visiting a dentist than were regular attenders, the effect being strongest among 65+-year-olds. **Conclusions.** Birth cohort has to be taken into account when associations between dental fear and oral health habits are studied. Dental teams have to be aware of the associations between dental fear and smoking because of the adverse effects of smoking on oral health and the risk of irregular attendance among those with high dental fear.

Key Words: Age, dental attendance, gender, smoking, tooth-brushing

Introduction

Oral health is affected by habits such as dental attendance, smoking, and oral hygiene. People with high dental fear more often report poor dental health than do those with low dental fear [1–7]. If the relationship between oral health and dental fear is mediated by oral habits, they should be associated with dental fear.

In most of the studies on dental fear [1–5], the relationship between dental fear and oral health habits has not been evaluated, an exception being dental attendance. There is strong evidence that the attendance habits of people with high dental fear are more irregular than those of people with lower dental fear [1–6]. And the level of oral hygiene is poorer among people with high dental fear than among those with low dental fear [6,7].

Regular smoking is more often reported by people with poor oral health than by those with good oral health [8], although the relationship between smoking and dental fear is not well known. Current

smokers report higher anxiety levels than people who have never smoked or are ex-smokers [9], and anxiety in general has been suggested to be associated with smoking [9,10]. It could be assumed that people who report dental fear are more likely to be smokers.

Aiming to evaluate the association between dental fear and oral health habits, our hypotheses were that dental fear is associated with oral health habits, and that age, gender, and/or education may confound or modify these associations, as they have been found to be associated with both dental fear and oral health habits [1–16].

Material and methods

This cross-sectional study is part of a 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 ($n=8028$) was representative of the Finnish population aged 30 years and older. The final sample size was 7977, of whom 6896 were interviewed in their homes by professional interviewers from the Statistical Centre of Finland. The response rate was 88%. Detailed information on the sampling method and interview has been published elsewhere [17].

Dental fear was covered by a single question: "How afraid are you of visiting a dentist?" The reply alternatives ("Not at all", "Somewhat", and "Very") were first used separately. Later, the alternatives "Not at all" and "Somewhat" were combined within one category indicating low or no fear, while "Very" was used as the category of high fear. Frequency of tooth-brushing was determined by the question: "How often do you brush your teeth?" The reply alternatives "More than twice a day" and "Twice a day" were combined within the category "At least twice a day", and "Once a day", "Less than every day", and "Never" within the category "Less than twice a day". The frequency of other tooth-cleaning habits was ascertained by the question: "When cleaning and caring for your mouth and teeth, how often do you use dental floss or interdental brush, toothpicks, and/or fluoride toothpaste?" The reply alternative "Daily" was kept, and the alternatives "Weekly", "Less than weekly", and "Not at all" were combined within the category "Less than daily". The question on regularity of smoking had three reply alternatives; "Daily" indicated "Regular smoking", while "Occasionally" and "Not at all" were combined as "Smoking occasionally or not at all".

Regularity of dental attendance was determined by the question: "Do you usually visit a dentist?", with three reply alternatives. "Regularly for check-up" indicated "Regular attendance" and "Only when I have pain or other problems" and "Never" were combined as "Irregular attendance". Regularity of dental visits was dealt with by the questions: "How many times during the last 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 best described the regularity of attendance among the entire study group and was chosen for use in further analyses [4]. Details of the interview have been published elsewhere [17]. For this study, we selected interviewees who had reported having either "only natural teeth" or "natural teeth and partial dentures". There were 5557 participants in the analyses, i.e. 81% of the interviewees.

For the present study, each participant's background was described by age, gender, and attained level of education, all of which have been found to be associated with dental fear [1,4,18,19]. Age was rounded off to the nearest full year. For the analyses,

age was categorized within three groups (30–34, 35–64, and 65+ years) based on the observed age-specific percentages of people with dental fear. The purpose was to form age groups among which the prevalence of dental fear would vary. The categorization also reflected the history of the provision of dental services for different age groups in Finland during recent decades [4]. Level of education was assessed using information on formal schooling and vocational training. For the analyses, level of education was categorized within three levels: basic, secondary, and higher.

Statistics

We evaluated bivariate associations between dental fear and tooth-cleaning habits, smoking and dental attendance in accordance with age, gender, and level of education. Chi-square tests were used to evaluate the statistical significances of these associations. As several statistically significant associations were found, the possible effects of age, gender, and level of education were considered in the analyses of the association between dental fear and oral health habits by including these variables in a multivariable model.

Multiple logistic regression analysis was conducted using dichotomized dental fear as the dependent variable (very afraid = 1 and somewhat or not at all afraid = 0). The following independent variables were used in the logistic regression models and were dichotomized to 0 and 1 as follows: tooth-brushing (at least twice a day = 1), use of toothpaste (daily = 1), use of dental floss (daily = 1), use of toothpicks (daily = 1), smoking (regularly = 1), dental attendance (irregular = 1), and gender (woman = 1). Categorization of oral health habits was based on recommendations commonly used in Finland in oral health education. Level of education (basic, secondary, high) and age (30–34, 35–64, 65+ years) were used as category variables. A manual method of backward elimination was used, by excluding from the full model interaction terms and 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. The aim was to obtain a model that was parsimonious and fitted sufficiently well. Statistical methods for handling correlated data with unequal sampling probabilities were used to take account of the two-stage cluster sampling. In the analyses, the parameter estimates and confidence intervals were adjusted using the svytab and svylogit procedures of STATA, version 8.0 [20].

Results

Oral health habits differed between participants at different levels of dental fear, between the different age groups, and between men and women. Among

65+-year-olds, those who were very afraid of visiting a dentist were less likely to brush their teeth at least twice a day and to use dental floss daily than were those who were less afraid. Interdental cleaning, especially daily use of dental floss, was uncommon. Daily use of toothpicks was more common among those who were not at all afraid than among those who were somewhat or very afraid of visiting a dentist (Table I).

There was a tendency among both women and men towards poorer tooth-cleaning habits by those who were very afraid than by those who were somewhat or not at all afraid. This difference was statistically significant among women for tooth-brushing and use of dental floss. Women had better tooth-cleaning habits than men had (Table II). Higher educated people were more likely to brush their teeth at least twice a day than were those with basic or secondary education. For people with basic education, daily use of dental floss was less common among those who were very afraid than among those who were somewhat or not at all afraid of visiting a dentist. Education was more strongly associated with oral hygiene than with dental fear (Table III).

In all age groups (Table I), and both women and men (Table II), regular smoking was more common among those who were very afraid of visiting a

dentist than among others who reported less dental fear. Individuals with a high level of education were less likely to smoke than were those with basic or secondary education (Table III). Among people with basic or secondary education, regular smoking was more common if they were very afraid than it was if they were somewhat or not at all afraid of visiting a dentist (Table III).

The results of logistic regression analysis indicated that smoking was associated with dental fear. Regular smokers were more likely to be very afraid of visiting a dentist than were participants who reported smoking occasionally or not at all. Frequency of tooth-brushing was also associated with dental fear, but only among 65+-year-olds. Among them, those who brushed their teeth less than twice a day were more likely to be very afraid of visiting a dentist than were those who brushed their teeth at least twice a day. When added to the model simultaneously with age, gender, level of education, and regularity of dental attendance, the frequencies of use of toothpaste, dental floss, or toothpicks were not associated with dental fear. The association between dental fear and attendance was modified by age. Irregular attenders were more likely to be very afraid of visiting a dentist than were regular attenders; this association was strongest among

Table I. Age-specific percentages of Finnish adults with different reported oral health habits and different levels of reported dental fear ($n=5557$)

	Age group ¹			
	30-34 $n=724$	35-64 $n=3970$	65+ $n=863$	All $n=5557$
At least twice a day toothbrushing				
Not at all	64	61	55 ^a	61
Somewhat	65	63	60 ^a	63
Very much	67	63	31 ^a	61
Daily use of toothpaste				
Not at all	82	80	84	81
Somewhat	83	83	85	83
Very much	84	81	90	82
Daily use of dental floss				
Not at all	5	11	13 ^a	10 ^a
Somewhat	6	9	7 ^a	8 ^a
Very much	5	8	5 ^a	7 ^a
Daily use of toothpicks				
Not at all	10	30	37	29 ^a
Somewhat	10	27	33	25 ^a
Very much	12	28	25	25 ^a
Regular smoking				
Not at all	30 ^a	23 ^b	8 ^a	21 ^b
Somewhat	26 ^a	24 ^b	8 ^a	23 ^b
Very much	46 ^a	42 ^b	24 ^a	41 ^b
Irregular attendance				
Not at all	40	36 ^b	47 ^b	39 ^b
Somewhat	43	42 ^b	59 ^b	44 ^b
Very much	57	64 ^b	92 ^b	65 ^b

^a $P < 0.05$ and ^b $p < 0.001$ (chi-square tests) for differences between different levels of dental fear.

¹Participants very afraid of visiting a dentist among 30- to 34-, 35- to 64- and 65+-year-olds numbered 103, 408 and 46, respectively.

Table II. Percentages of Finnish women and men according to different reported oral health habits and reported level of dental fear ($n = 5557$)

	Men		Women	
	Not at all or somewhat afraid $n = 2448$	Very afraid $n = 179$	Not at all or somewhat afraid $n = 2552$	Very afraid $n = 378$
At least twice a day toothbrushing	46	40	77 ^a	71 ^a
Daily use of toothpaste	77	74	87	86
Daily use of dental floss	5	3	14 ^a	10 ^a
Daily use of toothpicks	25	23	30	26
Regular smoking	27 ^b	54 ^b	16 ^b	34 ^b
Irregular attendance	47 ^b	79 ^b	33 ^b	57 ^b

^a $P < 0.05$ and ^b $p < 0.001$ (chi-square tests) for differences between different levels of dental fear.

65+-year-olds. Dental fear and gender were also associated, i.e. women more likely than men to be very afraid of visiting a dentist (Table IV).

Discussion

Our results indicate that the participants with high dental fear were more likely to smoke regularly than were those with lower levels of dental fear, but because this was a cross-sectional study no causal interpretations can be made. There was a tendency toward poorer tooth-cleaning habits among those who were very afraid than among those who were less afraid of visiting a dentist. To measure dental fear, we used a single-item that has been shown to be valid and reliable in the adult Finnish and Norwegian populations [21,22]. In the present study, dental fear was determined during a home interview, which should result in a more valid estimation of dental fear than when the question is put during a clinical examination. Because of the large nationally representative sample and high rate of participation in the home interview, the results of this study can be generalized to the adult Finnish population aged 30 years and older. Our results confirm previous findings concerning the associations between dental fear and attendance and tooth-cleaning habits [1-7].

Age modified the association between dental fear and tooth-brushing. Among 65+-year-olds, those who brushed their teeth less than twice a day were more likely to be very afraid of visiting a dentist than were those who brushed their teeth at least twice a day. The lack of such an association among the younger age groups might reflect a more positive attitude towards their teeth among 30- to 64-year-olds than among 65+-year-olds. The 65+-year-olds might be less careful about their teeth or they might never have learned similar tooth-brushing habits as the younger people have. In a study of 35- to 64-year-olds in Norway, only minor differences were found in oral health behaviour between groups with high and low dental fear [7]. Neither their results nor ours support the hypothesis that individuals with high dental fear try to avoid dental treatment by maintaining good oral hygiene.

Age also modified the association between dental fear and dental attendance. Irregular attenders were more likely to be very afraid of visiting a dentist, especially among 65+-year-olds. This might reflect their negative attitude towards caring for their teeth. Among other explanations that we have suggested earlier [4] might be the better public subsidization of dental care from which the younger age group has benefited or the difference in treatment pattern between the younger and older age groups. Some

Table III. Percentages of Finnish adults according to different reported oral health habits, attained level of education, and reported level of dental fear ($n = 5552$; the information on education was missing in the case of 5 participants)

	Education					
	Basic		Medium		High	
	Not at all or somewhat afraid $n = 1687$	Very afraid $n = 188$	Not at all or somewhat afraid $n = 1704$	Very afraid $n = 210$	Not at all or somewhat afraid $n = 1607$	Very afraid $n = 156$
At least twice a day toothbrushing	50	48	58	60	76	77
Daily use of toothpaste	83	83	82	83	81	80
Daily use of dental floss	8 ^a	4 ^a	8	8	13	11
Daily use of toothpicks	29	25	27	25	25	23
Regular smoking	25 ^b	48 ^b	26 ^b	42 ^b	14 ^b	29 ^b
Irregular attendance	51 ^b	76 ^b	40 ^b	66 ^b	29 ^b	49 ^b

^a $P < 0.05$ and ^b $p < 0.001$ (chi-square tests) for differences between different levels of dental fear.

Table IV. Summary of the results of logistic regression analysis on the association between dental fear, as a dependent variable (very afraid = 1; somewhat and not at all afraid = 0), and oral health habits among adults in Finland ($n = 5557$)

Independent variables ¹	Crude OR	OR	95% CI	<i>p</i>
Gender (woman = 1)	2.1	2.9	2.4–3.5	<0.001
Smoking (regularly = 1)	2.5	2.3	1.9–2.8	<0.001
Toothbrushing (less than twice a day = 1)				
Among 30- to 34-year-olds	0.9	1.0	0.6–1.6	
Among 35- to 64-year-olds	1.0	1.0	0.8–1.3	0.018
Among 65+-year-olds	2.9	2.6	1.4–5.1	
Dental attendance (irregular = 1)				
Among 30- to 34-year-olds	1.9	2.1	1.4–3.2	
Among 35- to 64-year-olds	2.9	3.1	2.4–3.8	0.010
Among 65+-year-olds	10.0	9.4	3.2–27.1	

Goodness-of-fit test $F_{(10,2298)} = 33.32$, $p < 0.001$

¹Independent variables that were not significantly associated with dental fear were: use of toothpaste, use of dental floss, use of toothpicks, and attained level of education.

modifying or confounding effects between gender, oral health habits, and dental fear were expected, as women have reported better oral health habits [15,23,24] and higher dental fear than men have [1–4,7,18]. However, the association between dental fear and oral health habits was independent of gender.

In our study, there was an association between dental fear and smoking. Regular smoking was reported more often by those who were very afraid than by participants who were less afraid of visiting a dentist. As far as we know, the association between dental fear and smoking has not been the focus of earlier studies. Our finding that participants who were very afraid of visiting a dentist were more likely to smoke regularly is in concordance with results according to which, in general, smokers report higher anxiety levels than non-smokers [9]. Smoking is an indicator of a stressful lifestyle, and many smokers and some researchers believe that smoking has a calming effect [9,25]; however, the evidence for this is inconsistent. Some researchers believe that nicotine is an anxiogenic agent and that giving up smoking is rapidly followed by a reduction in anxiety, which may reflect removal of nicotine [25]. Both smoking [9] and dental fear [19] have been associated with psychological lack of well-being. People who smoke regularly and have high dental fear might be psychologically more vulnerable than people who do not smoke and have low dental fear.

Clustering of behaviors describes a person's oral health-related lifestyle [26]. Since smoking, a tendency towards poor tooth-cleaning habits, and irregular attendance are common among those with high dental fear, dental fear and poor health-related lifestyle could be linked, but this association seems to vary according to age. Poor oral health-related lifestyle has adverse effects on oral health and on success of treatment seen as poor oral health, avoidance, and difficulties in completing dental

care [1–8,12,13]. A poor oral-health-related lifestyle could affect oral-health-related quality of life. There is also an association between oral-health-related quality of life and dental fear. People with high dental fear more often report poor oral-health-related quality of life than do people with lower dental fear [27–29].

In conclusion, birth cohort has to be taken into account when associations between dental fear and oral health habits are studied. Dental teams have to be aware of the associations between dental fear and smoking, tooth-cleaning, and attendance habits, because of the adverse effects of poor habits on oral health among those with high dental fear.

Acknowledgments

This study, a part of the Health 2000 Examination Survey organized by the National Public Health Institute (KTL) of Finland, was supported by the Finnish Dental Society Apollonia and the Finnish Dental Association. V.P. acknowledges a personal grant from the Finnish Dental Society Apollonia.

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