

ORIGINAL ARTICLE

Alcohol use disorder, smoking and dental fear among adults in Finland

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Abstract

Objective. This study investigated the association between dental fear and alcohol use disorder and smoking controlling for age, gender and attained level of education as well as anxiety and depressive disorders. **Materials and methods.** Nationally representative data on Finnish adults, 30 + years old ($n = 5953$), were gathered in interviews. Dental fear was measured in an interview using the question: ‘How afraid are you of visiting a dentist?’ The alternatives for replying were: ‘Not at all’, ‘Somewhat’ and ‘Very’. Alcohol use, anxiety and depressive disorders were assessed with a standardized structured psychiatric interview based on DSM-IV criteria. The question on regularity of smoking gave three reply alternatives: smoking ‘Daily’, ‘Occasionally’ or ‘Not at all’. **Results.** When socio-demographics and anxiety and depressive disorders were controlled for, those with lifetime alcohol use disorder were more likely to have high dental fear than were those without this disorder. When smoking was added to the model, those who smoked regularly were more likely to have high dental fear than those who smoked occasionally or not at all. In this model, alcohol use disorder was not statistically significantly associated with dental fear. **Conclusions.** The results of this study support the suggestion that some individuals may have personality traits that make them vulnerable to substance use disorders and dental fear.

Key Words: alcohol dependence, alcohol use disorder, smoking, vulnerability to dental fear

Introduction

Dental fear has been suggested to contain both exogenous and endogenous components [1]. The exogenous components refer to dental fear acquired as a function of direct or vicarious conditioning [2]. The endogenous components refer to the psychological vulnerability that some individuals may have to dental fear [3–5]. People with dental fear may have psychological vulnerability similar to that of people with anxiety, depressive and substance use disorders [3,4,6–9].

Alcohol abuse and dependence are common psychiatric disorders related to anxiety disorders [10–12] and they co-occur more often than would be expected due to chance [13]. The association between dental fear and alcohol use disorders has been included in only a few previous studies. As far as we know, only one study [12] has dealt with the association between dental fear and alcohol dependence, using

a diagnostic instrument (standardized structured psychiatric interview) to assess alcohol dependence. In that study, symptoms of alcohol dependence and multiple fears predicted onset of dental anxiety among young adults. Those with high dental fear were more likely to suffer from alcohol dependence than were those with a lower level of dental fear. The sample used represented the general population, but comprised a limited age group [4,12].

Nicotine as a psychoactive substance has been associated with anxiety in general [14,15]. Current smokers have reported higher anxiety levels than did people who have never smoked or are ex-smokers [15,16]. Moreover, the connection between smoking and depression is well-established, depressed individuals being over-represented among smokers [17,18]. The relationship between smoking and dental fear is not well known. In one study it was reported that those with high dental fear were more likely to smoke than were those with a lower level of

dental fear [19]; but this association has not been studied controlling for anxiety and depressive disorders.

The aim of the present study was to evaluate the association between dental fear and alcohol use disorder and smoking, controlling for age, gender, attained level of education as well as anxiety and depressive disorders in a large sample drawn from the adult population representing 30 + year-olds in Finland. The study hypothesis was that those having alcohol use disorder or smoking regularly would be more likely to have high dental fear than those not having alcohol disorder or smoking occasionally or not at all.

Materials 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 Institute for Health and Welfare (former National Public Health Institute). Permission for the study was given by the ethics committees of the University Hospital Region of Helsinki and Surroundings and by the National Institute for Health and Welfare. The two-stage stratified cluster sample ($n = 8028$) represented the Finnish population aged 30 years and older. Detailed information on the survey has been published elsewhere [20]. The final sample consisted of 5953 participants, which is 74% of the original study population. Those participants who failed to participate in the diagnostic psychiatric interview and/or to answer the question on dental fear were excluded ($n = 1075$). Among the final sample and among those excluded the mean ages were 52.2 and 59.9 years ($p < 0.001$), the prevalence of men were 45.8 and 43.8% ($p = 0.101$), those having high education were 29.3 and 16.9% ($p < 0.001$) and those smoking regularly were 21.7 and 22.2% ($p = 0.654$), respectively.

Participants' socio-demographic characteristics were described by age, gender and attained level of education. Level of education was assessed using information on formal schooling and vocational training; and for the analyses the level of education was divided into three levels: basic, secondary and higher education.

In the home interview, dental fear was covered by a single question: 'How afraid are you of visiting a dentist?' The alternatives for replying ('Not at all', 'Somewhat' and 'Very') were first used as such. Later the alternatives 'Not at all' and 'Somewhat' were combined into a category indicating low or no fear and 'Very' was used as the category for high level of fear. This categorization was made because high dental fear has most severe clinical consequences on dental attendance and dental health. A single question has been shown to be valid and reliable for measuring dental fear [21,22].

The psychiatric diagnostic tool used here was the computerized Munich version of the Composite International Diagnostic Interview (M-CIDI) [23]. Using operationalized criteria for DSM-IV diagnoses, this tool gave the DSM-IV diagnoses for 12-month and lifetime alcohol use disorders (alcohol dependence and alcohol abuse) as well as for 12-month prevalence of anxiety and depression (major depression and/or dysthymia) [23–25]. The DSM-IV diagnostic hierarchy was checked and the diagnosis of alcohol abuse was given only to those who did not fill the criteria for alcohol dependence. The variable 'Alcohol use disorder' included both alcohol abuse and/or alcohol dependence. The results pertaining to the prevalence of anxiety and depressive disorders as well as those for alcohol use disorders have been published previously [26]. The question concerning regularity of smoking gave three reply alternatives, of which 'Daily' indicated 'Regular smoking'; 'Occasionally' and 'Not at all' were combined as 'Smoking occasionally or not at all'. This categorization was made because regular smoking has more severe clinical consequences on oral health than smoking occasionally or not at all.

Statistics

Bivariate associations between dental fear and alcohol use disorders and smoking were evaluated. The statistical significances of differences in the prevalence of alcohol use disorders and smoking at different levels of dental fear were evaluated with Chi-square tests. Multiple logistic regression analyses were used to evaluate the association between dental fear and alcohol use disorders, controlling first for the effect of age, gender and attained level of education. Then the analyses were repeated adding anxiety and depressive disorders and finally adding smoking to the model. Age was entered into the multiple logistic regression analysis as a continuous variable. The level of statistical significance was set at $p < 0.05$. To take into account the two-stage cluster sampling, statistical methods for handling correlated data with unequal sampling probabilities were used. In the analyses the parameter estimates and confidence intervals were adjusted using the svytab and svylogit procedures of STATA, version 8.0 [27].

Results

The prevalence of alcohol-related psychiatric diagnoses and smoking were higher among men than among women. Depressive and anxiety disorders were more commonly reported by women than by men (Table I). Among women the prevalence of high dental fear was greater among those with lifetime occurrence of alcohol abuse, alcohol dependence and alcohol use disorder than among those with no such disorders

Table I. Description of the sample representing Finnish adults age 30 years and older ($n = 5953$).

	All participants		Men %	Women %
	<i>n</i>	%		
Gender				
Men	2729	54.8		
Women	3224	54.2		
Age				
30–34	665	11.1	11.6	10.7
35–44	1397	23.5	24.8	22.3
45–54	1574	27.6	28.8	26.4
55–64	1039	18.1	17.6	18.5
65+	1278	19.8	17.1	22.2
Education				
Basic	2275	37.7	36.7	38.6
Secondary	1936	33.0	38.3	28.1
High	1741	29.3	25.0	33.3
Alcohol-related psychiatric diagnoses ^a				
Alcohol abuse, 12 months (yes)	19	0.3	0.7	0.0
Alcohol dependence, 12 months (yes)	222	3.9	6.7	1.4
Alcohol use disorder, 12 months (yes)	241	4.3	7.4	1.4
Alcohol abuse, lifetime (yes)	116	2.1	3.9	0.4
Alcohol dependence, lifetime (yes)	478	8.5	14.3	3.1
Alcohol use disorder, lifetime (yes)	594	10.5	18.0	3.5
Depressive disorder ^{a,b} (yes)	386	6.4	4.5	8.2
Anxiety disorder ^{a,c} (yes)	241	4.0	3.5	4.6
Smoking regularly (yes)	1287	22.2	27.7	17.0

^aAccording to the Composite International Diagnostic Interview following the DSM-IV hierarchy.

^bDysthymia and Major depression.

^cAgora phobia, Generalized anxiety disorder, Panic disorder and Social phobia.

(Table II). The prevalence of high dental fear was higher among those who smoked regularly than among those who smoked occasionally or not at all (Table III).

In the logistic regression analyses, when age, gender and attained level of education were controlled for, those with lifetime occurrence of alcohol use disorder (including alcohol dependence and alcohol abuse) were more likely to have high dental fear than were those without alcohol use disorder (Table IV). Controlling for socio demographics and looking at alcohol dependence separately from alcohol abuse, similar results were obtained. Those with lifetime occurrence of alcohol dependence were more likely to have high dental fear than were those without alcohol dependence, OR = 1.4; 95% CI = 1.0–1.9; $p = 0.026$ (data not presented in the tables). When controlling the models for anxiety and depressive disorders in addition to socio demographics, those with lifetime occurrence of alcohol use disorder were more likely to have high dental fear than were those without this disorder.

In the corresponding gender-specific models, similar associations were found among women, but not among men (Table V). When, in addition to socio demographics, alcohol use disorder, anxiety and depressive disorders, smoking was added into the model, those who smoked regularly were more likely to have high dental fear than those who smoked occasionally or not at all. In this model, alcohol use disorder was no longer statistically significantly associated with dental fear. This was found both in analyses that included all participants and separately for men and women. The association between dental fear and alcohol use disorder was also studied separately among those smoking regularly and those smoking occasionally or not at all. The first models included age, gender and education and the second models socio demographics, anxiety and depressive disorders as confounders. In these models no statistically significant associations between dental fear and alcohol use disorder were found (data not presented in the tables).

Table II. Gender-specific prevalence of alcohol abuse, alcohol dependence and alcohol use disorder^a (12 months and lifetime) according to level of dental fear among 30 + year-olds in Finland (*p*-values for chi-square tests).

	Alcohol abuse			Alcohol dependence			Alcohol use disorder		
	Yes	No	<i>p</i>	Yes	No	<i>p</i>	Yes	No	<i>p</i>
<i>12 months prevalence of alcohol disorders</i>									
Men									
Very afraid	10.5	6.2		6.9	6.1		7.2	6.1	
Somewhat afraid	10.4	23.2	0.361	28.4	22.9	0.189	26.7	22.9	0.334
Not at all afraid	79.0	70.6		64.7	71.0		66.1	71.0	
Women									
Very afraid	^b	12.5		20.0	12.4		20.0	12.4	
Somewhat afraid	^b	31.3		33.7	31.2	0.210	33.7	31.3	0.206
Not at all afraid	^b	56.3		46.3	56.4		46.3	56.4	
All									
Very afraid	10.5	9.5		9.4	9.5		9.5	9.5	
Somewhat afraid	10.4	27.4	0.258	29.4	27.4	0.786	27.9	27.4	0.984
Not at all afraid	79.0	63.1		61.2	63.1		62.6	63.2	
<i>Lifetime prevalence of alcohol disorders</i>									
Men									
Very afraid	7.9	6.2		7.7	6.0		7.8	5.9	
Somewhat afraid	22.4	23.2	0.767	26.3	22.7	0.084	25.5	22.7	0.086
Not at all afraid	69.8	70.6		65.9	71.4		66.8	71.5	
Women									
Very afraid	34.8	12.4		22.8	12.2		24.3	12.1	
Somewhat afraid	22.5	31.3	0.044	39.3	31.0	< 0.001	37.2	31.0	< 0.001
Not at all afraid	42.7	56.3		37.9	56.8		38.5	56.9	
All									
Very afraid	10.8	9.5		10.6	9.4		10.6	9.4	
Somewhat afraid	22.4	27.4	0.464	28.8	27.2	0.470	27.5	27.3	0.589
Not at all afraid	66.8	63.1		60.6	63.3		61.9	63.3	

^aAlcohol use disorder included both alcohol abuse and/or alcohol dependence.

^bNone of the participants belonged to this group.

Discussion

Dental fear was associated both with smoking and with alcohol use disorders, even when the most important confounding factors (socio-demographics and anxiety and depressive disorders) were controlled for. Those who smoked regularly or had alcohol use disorder were more likely to have high dental fear than were those who smoked occasionally or not at all or had no alcohol use disorder. As far as we know, this was the first study on the association between dental fear and alcohol use disorders assessed with a psychiatric method and controlling for anxiety and depressive disorders.

It was interesting that, when smoking was added to the model, the association between dental fear and alcohol use disorder was no longer significant. This might be due to the high prevalence of smoking

among people with both alcohol use disorder [28–30] and dental fear [19]. Many smokers and some researchers believe that smoking has a calming effect [15,16]. However, the evidence for this is inconsistent, as some researchers think that nicotine is an anxiogenic agent. Giving up smoking is quite rapidly followed by a reduction in anxiety, which may be due to removal of nicotine [16]. In addition, smoking has also been associated both with general anxiety [14,15] and with depression [17,18]; anxiety and/or depressive disorders might affect the relationship between smoking and dental fear. Additionally, since smoking and alcohol dependence [28–30] and smoking and dental fear are associated [19] smoking could mediate the effect of alcohol use disorder on dental fear. However, because of the cross-sectional design of this study, true causal interpretations cannot be made. Longitudinal studies are needed to study

Table III. Gender-specific prevalence of smoking according to level of dental fear among 30 + year-olds in Finland (*p*-values for chi-square tests).

	Smoking		<i>p</i>
	Regularly	Occasionally or Not at all	
Men			
Very afraid	11.2	4.3	< 0.001
Somewhat afraid	22.1	23.5	
Not at all afraid	66.7	72.2	
Women			
Very afraid	23.0	10.4	< 0.001
Somewhat afraid	32.6	31.0	
Not at all afraid	44.4	58.6	
All			
Very afraid	15.9	7.7	< 0.001
Somewhat afraid	26.3	27.6	
Not at all afraid	57.8	64.7	

whether smoking mediates the effect of alcohol disorder on dental fear or is merely a confounding factor in this association. In this study when anxiety and depressive disorders were controlled for, those who smoked regularly were likely to have high dental fear.

In a previous study with young adults when the effect of gender was controlled for, those with high dental anxiety were more likely than the less anxious to have a diagnosis of substance dependence (alcohol and cannabis) [4]. This is in concordance with our results; those with high dental fear were more likely to have an alcohol use disorder than were those with lower level of dental fear. Locker et al. [4] suggested that alcohol dependence would be linked to anxiety disorders rather than to dental anxiety *per se*. In the present study concerning the association between dental fear and alcohol use disorders, anxiety and depressive disorders were controlled for. Thus, there might be a direct link between alcohol use disorder and dental fear.

In this study, alcohol use disorder during the last 12 months was not associated with dental fear, but lifetime alcohol use disorder was. The association between alcohol use disorder and dental fear was not strong; the prevalence of alcohol use disorder was higher among men than among women and dental fear was more common among women than among men. The number of participants with high dental fear and alcohol use disorder during the last 12 months was limited and the association between alcohol use disorder and dental fear can more easily be found by studying occurrence of alcohol use disorder over a lifetime than during the last 12 months. It might also be that lifetime alcohol use problems describe psychological vulnerability more than do problems with alcohol use that occur over a shorter recall period, which might describe temporary problems.

The prevalence of alcohol use disorder was greater among those with high dental fear than among other participants. However, the majority of those with alcohol use disorder did not have high dental fear. This is in concordance with previous findings [4,12]. Among most people with dental fear, exogenous components, such as treatment or vicarious experiences [2], may be more important in the development of dental fear than psychopathology is. Still, some individuals may be vulnerable to psychological problems, such as anxiety disorders and alcohol use disorders. Among this sub-group the origin of dental fear could be, at least partly, endogenous. It has been suggested that those patients with dental fear who also have other psychiatric disorders are likely to maintain dental anxiety [4,12]. For those more vulnerable to psychiatric disorders and dental fear it is more difficult for dentists and psychologists to help them to go into remission from dental fear [3,4,31,32]. Studies have also shown that genetic factors play an important role in the pathogenesis of alcohol dependence [33], that nicotine dependence is substantially heritable [34] and there may also be a genetic component in dental fear [35]. There may be endogenous

Table IV. Results of logistic regression analyses of the association between dental fear and alcohol use disorder,^a anxiety and depressive disorders and smoking among 30 + year-olds in Finland (reference groups = somewhat or not at all afraid, no alcohol use disorder, no anxiety disorders, no depressive disorders and smoking occasionally or not at all).

	Model 1			Model 2			Model 3		
	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>
Alcohol use disorder (lifetime)	1.4	1.1–1.9	0.014	1.4	1.0–1.8	0.046	1.2	0.9–1.6	0.312
Anxiety disorders				1.5	1.0–2.2	0.058	1.3	0.9–2.0	0.163
Depressive disorders				1.3	1.0–1.8	0.069	1.3	1.0–1.8	0.092
Smoking							2.1	1.7–2.6	< 0.001

^aAlcohol use disorder included both alcohol abuse and/or alcohol dependence.

Model 1 adjusted for age, gender and education. Model 2 adds Anxiety disorders (Agora phobia, Generalized anxiety disorder, Panic disorder and Social phobia) and Depressive disorders (Dysthymia and Major depression). Model 3 adds Smoking.

Table V. Gender-specific results of logistic regression analyses of the association between dental fear and alcohol use disorder,^a anxiety and depressive disorders and smoking among 30 + year-olds in Finland (reference groups = somewhat or not at all afraid, no alcohol use disorder, no anxiety disorders, no depressive disorders and smoking occasionally or not at all).

	Model 1			Model 2			Model 3		
	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>
Women									
Alcohol use disorder (lifetime)	1.9	1.2–3.2	0.005	1.8	1.1–2.8	0.017	1.6	1.0–2.6	0.062
Anxiety disorders				1.4	0.9–2.2	0.198	1.3	0.8–2.0	0.365
Depressive disorders				1.4	0.9–2.0	0.104	1.3	0.9–2.0	0.133
Smoking							1.9	1.5–2.5	< 0.001
Men									
Alcohol use disorder (lifetime)	1.2	0.8–1.8	0.327	1.2	0.8–1.7	0.475	1.0	0.6–1.4	0.861
Anxiety disorders				1.8	0.9–3.5	0.101	1.6	0.8–3.2	0.215
Depressive disorders				1.1	0.6–2.3	0.741	1.1	0.5–2.3	0.745
Smoking							2.5	1.8–3.3	< 0.001

^aAlcohol use disorder included both alcohol abuse and/or alcohol dependence.

Model 1 adjusted for age and education. Model 2 adds Anxiety disorders (Agora phobia, Generalized anxiety disorder, Panic disorder and Social phobia) and Depressive disorders (Dysthymia and Major depression). Model 3 adds Smoking.

components in development of that alcohol use disorder, habit of smoking and dental fear. The results of this study may indicate that people with alcohol use disorder, who smoke regularly and have dental fear, might belong to a group with ‘constitutional vulnerability’, which is characteristic of the endogenous type of dental fear [3,4,36].

There are several strengths in this study. The sample was large and nationally representative with high rates of participation in the home interview. Thus, the findings of the study can be generalized to the adult Finnish population aged 30 years and older. Dental fear was measured with a single item that has been shown to be valid and reliable in the adult Finnish and Norwegian populations [21,22]. Dental fear was ascertained during a home interview, which might result in a more valid estimation of dental fear than asking about it in connection with a clinical examination, in which those with high fear might not participate. Psychological disorders were defined by a structured standardized psychiatric interview technique, which can be used as a diagnostic instrument [23–25]. In the interview, diagnoses were made according to DSM-IV criteria. The use of a diagnostic interview instead of self-completed measures increases the value of the results of this study. However, because the study is cross-sectional, no causal interpretations can be made, and it is not possible to know whether alcohol use disorder or smoking increases dental fear or vice versa.

In conclusion, our findings with a nationally representative sample support previous findings that those with alcohol use disorder or those who smoked regularly are more likely to have high dental fear than are those without alcohol use disorder or who

smoked occasionally or not at all. This supports the suggestion that some individuals may have personality traits that make them vulnerable to substance use disorders and dental fear [1,4,5]. Dentists should take this endogenous vulnerability to dental fear into account when treating fearful patients, as patients with an endogenous origin of dental fear might benefit from a different kind of treatment for dental fear than do patients with an exogenous origin of dental fear.

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