

ORIGINAL ARTICLE

Association of dental anxiety to personality traits in a general population sample of Finnish university students

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Objective. To estimate the association between personality and dental anxiety among Finnish University students. **Materials and methods.** A total of 880 university students in Finland returned the questionnaires addressing dental anxiety by using the Modified Dental Anxiety Scale (MDAS) questionnaire. In addition, the personality of traits (neuroticism, extraversion, agreeableness, conscientiousness and openness to experience) were noted. Personality traits of students were compared with the level (high, mild or none) of dental anxiety derived from the MDAS questionnaire. The relative odds of dental anxiety associated with the level of dental anxiety were estimated by logistic regression, Chi-Square tests and one-way analysis of variance (ANOVA). **Results.** Median age of the respondents was 22 years. Of the respondents, 99 (11.3%) were classified as dentally anxious patients (90, 12.2% of females; 9, 6.6% of males). Neuroticism was the only personality trait that was significantly associated with dental fear ($p < 0.001$). A tendency, although not significant, was seen between high dental fear and lower extraversion and agreeableness. **Conclusions.** Of the five different personality traits, neuroticism was a significant risk factor for developing dental anxiety, and this should be recognized in clinical practice.

Key Words: dental anxiety, NEO-PI test, NESTA-test, neuroticism, personality traits

Introduction

It has previously been demonstrated that patients with dental anxiety show a number of other co-morbid phobias: agoraphobia [1,2], social phobia [1,3] and other specific phobias—fear of heights, closed spaces, animals, blood or natural phenomena [3,4]. Dental fear also has a positive correlation with depression and mood disorders [1–4], alcohol dependence and substance abuse [1,4] and a variety of different psychiatric disorders [1,2]. The prevalence rate of co-morbid phobias can be up to 45% [3–5] and prevalence rate of co-morbid anxiety together with mood disorders 30–43% [4] with a tendency: the higher the degree of dental anxiety, the higher the presence of co-morbid phobias and disorders [1].

Some personality traits are closely related to dental fear and its course. Neuroticism and lower extraversion has been shown to be associated with extreme dental fear [6,7] and a chronic course of fear, i.e. a tendency to maintain fear over time [1,6]. In contrast, higher

extraversion is more likely to predict remission of fear [6]. Psychological profile can also show less ego strength and sensitization [8] or novelty seeking and immaturity [9]. Personality traits and the level of fear are linked to each other; the psychological profile of patients dentally anxious but *not highly anxious* is quite similar to normal (non-anxious) patients' profile [1,8].

In literature, there is no 'standardization' between the terms dental anxiety, high/extreme dental anxiety or dental phobia. There is also great variation in tests used for analysing dental anxiety. Here, we used dental anxiety/mild dental anxiety based on the classification of the MDAS test [10,11]. Dental phobia is understood as a specific phobia described in both DSM-IV and ICD-10 [12,13]. Based on earlier literature about one in six—one in eight patients can be considered to be dentally anxious [1,6,8,14–15]. One or two per cent are highly dentally anxious, phobic, patients. Roughly two thirds of these patients are women [1,14–15].

The first aim of our study was to investigate the prevalence of and gender difference in dental anxiety in a general Finnish population sample of first-year university students. Secondly, we examined whether the personality traits (neuroticism, extraversion, agreeableness, conscientiousness, openness) differ between persons with and without dental anxiety. Dental anxiety was assessed with the Modified Dental Anxiety Scale (MDAS) [10] and the personality traits were measured with NESTA, the Finnish version of NEO-PI [16].

Material and methods

Study population

The study population consists of students ($n = 7125$) starting university in autumn 2007 in four Finnish universities; Helsinki, Oulu, Jyväskylä and Kuopio. First, a single questionnaire was emailed to all new students enquiring into their willingness to participate in the study. Only those who had denied disclosure of their personal and address records outside the university were not on the mailing list. Those willing to participate ($n = 1551$, 21.8%) were sent a Finnish version of the Modified Dental Anxiety Scale (MDAS) [10] measuring dental fear. After about a year, the MDAS questionnaire was sent again to 1551 participants, together with personality test NESTA [16] for measuring personality traits. Respondents' age, gender and marital status were also recorded. The respondents completed the MDAS and NESTA via web-based questionnaires, programmed using Webropol survey software. After two reminders had been sent, 899 (58.0%) students completed the MDAS and NESTA questionnaires. Improperly filled ($n = 19$) questionnaires were excluded, leaving a total of 880 students in the final study population.

Variables

Dental anxiety. The Finnish version of the Modified Dental Anxiety Scale (MDAS) is a 5-item questionnaire purposed to measure dental fear of a person. MDAS has been shown to be a valid and reliable tool for that purpose [10,11]. The MDAS test includes five questions concerning dental treatment. Each question is answered with a Likert-type scale ranging from 1 (not anxious) to 5 (extremely anxious). Participants scoring 19 or above of a maximum of 25 points were considered to be dentally anxious patients, while patients scoring 5–11 points were considered not anxious at all. The mildly dentally anxious group was between these two.

Personality traits. The NESTA [16], a Finnish version of the NEO Personality Inventory (NEO-PI) [17], is a self-report questionnaire including 181 items for the assessment of personality traits. It measures five personality traits: Neuroticism, Extraversion, Agreeableness, Conscientiousness and Openness to experience. Each item is answered using a 5-point Likert scale from Strongly disagree to Strongly agree. NESTA has been proven a valid and reliable instrument for the Finnish population [16].

Statistical analyses

The statistical significance of group differences was assessed in categorical variables with χ^2 test or Fisher's Exact test. In continuous variables the significance of difference between two groups was investigated either with Student's t -test or Mann-Whitney U-test. In comparisons of three groups, the univariate Analysis of Variance test after controlling the age of the participants was used. If the distribution of continuous variables was non-normal, the Kruskal-Wallis test was used. All tests were two-tailed and

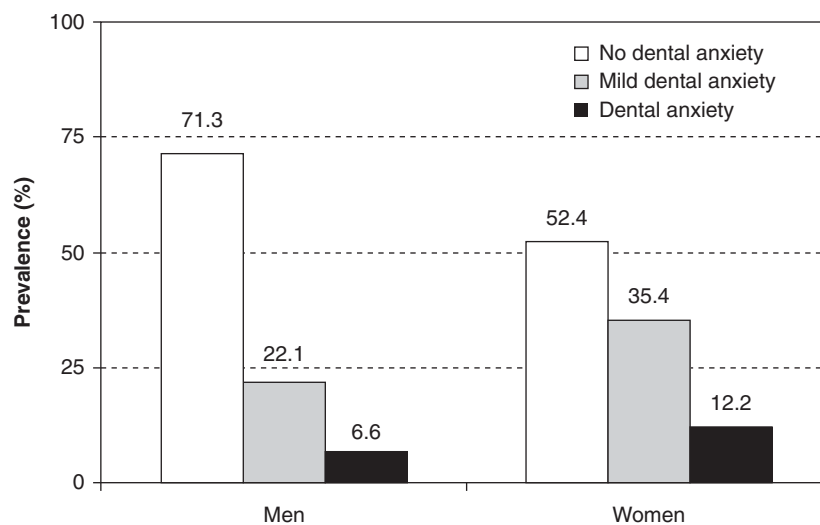


Figure 1. The prevalence of dental anxiety in Finnish male and female university students.

the limit for statistical significance was set at 0.05. All analyses were performed with PASW statistical software, version 18.

Results

The characteristics of the study population

Of all 880 participants, 737 (83.8%) were women and 136 (15.5%) were men. Gender was missing for seven subjects. Median (IQR) age was 22 (21–27) years (no gender difference, Mann-Whitney U-test, $p = 0.796$). A total of 530 (79.1%) respondents were unmarried (86.2% of male vs 77.7% female, $p = 0.045$).

Prevalence of dental anxiety and gender difference

Of the respondents, a total of 99 (11.3%) participants fulfilled the criteria for dental anxiety, while 291 (33.3%) participants had mild dental anxiety. As seen in Figure 1, dental anxiety was statistically significantly more common in females compared to males ($p < 0.001$).

Dental anxiety and personality traits

In the total data, dental anxiety had a statistically significant positive correlation to neuroticism ($r = 0.30, p < 0.000$) and negative correlation to extraversion ($r = -0.09, p = 0.005$) (Table I). In males, dental

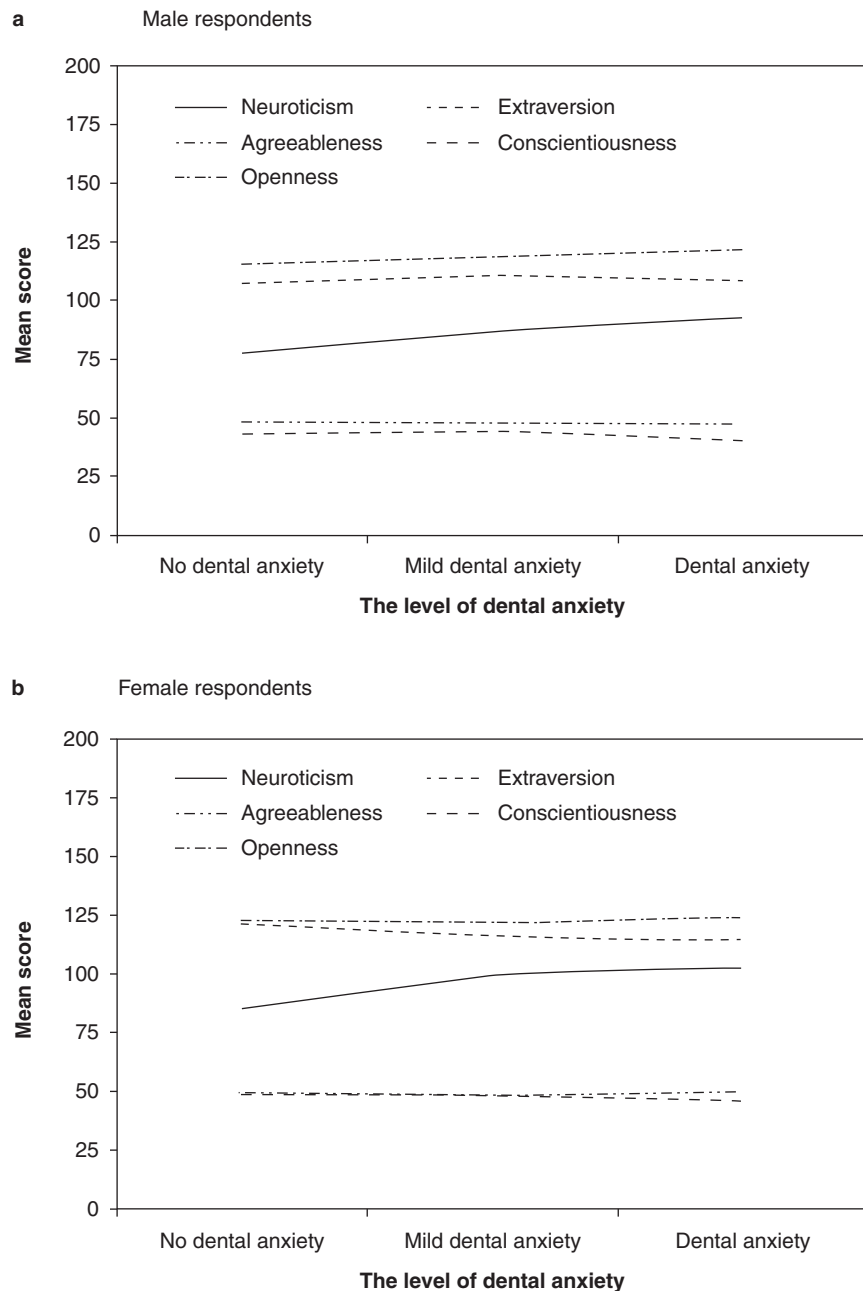


Figure 2. Mean scores of the five personality traits of Finnish male and female university students in relation to their level of dental anxiety.

Table I. Dental anxiety as measured with Modified Dental Anxiety Scale (MDAS) in relation to the personality traits according to NESTA, a Finnish sample of young adults.

	Correlation between sum scores of MDAS and personality traits		No dental anxiety <i>M</i> (SD)	Mild dental anxiety <i>M</i> (SD)	Dental anxiety <i>M</i> (SD)	<i>p</i> for difference ^b
	<i>r</i>	<i>p</i> -value ^a				
Men (<i>n</i> = 136)			<i>n</i> = 97	<i>n</i> = 30	<i>n</i> = 9	
Neuroticism	0.243	0.004	77.6 (28.4)	86.7 (27.5)	93.0 (28.4)	0.147
Extraversion	-0.037	0.670	106.9 (25.5)	110.1 (19.8)	108.4 (26.6)	0.816
Openness	0.058	0.505	115.4 (20.5)	118.4 (22.4)	121.2 (21.2)	0.708
Conscientiousness	-0.116	0.179	43.0 (12.6)	43.8 (14.7)	39.7 (11.2)	0.806
Agreeableness	-0.005	0.955	47.5 (6.7)	46.9 (7.3)	46.7 (9.4)	0.899
Women (<i>n</i> = 737)			<i>n</i> = 386	<i>n</i> = 261	<i>n</i> = 90	
Neuroticism	0.296	<0.001	84.5 (27.5)	99.5 (25.1)	102.0 (28.0)	<0.001
Extraversion	-0.132	<0.001	120.7 (22.6)	115.1 (23.8)	114.0 (26.5)	0.004
Openness	-0.003	0.931	122.3 (19.7)	121.7 (18.7)	122.9 (20.3)	0.882
Conscientiousness	-0.076	0.039	48.5 (10.8)	47.3 (11.4)	45.4 (11.9)	0.079
Agreeableness	-0.055	0.134	48.7 (6.2)	47.5 (6.6)	48.9 (6.3)	0.060
Total (<i>n</i> = 880)			<i>n</i> = 487	<i>n</i> = 292	<i>n</i> = 101	
Neuroticism	0.303	<0.001	83.1 (27.9)	98.2 (25.6)	100.8 (27.9)	<0.001
Extraversion	-0.094	0.005	118.0 (23.9)	114.6 (23.4)	113.7 (26.2)	0.039
Openness	0.021	0.542	120.9 (20.0)	121.4 (19.1)	122.7 (20.2)	0.637
Conscientiousness	-0.064	0.056	47.5 (11.4)	47.0 (11.8)	44.9 (11.8)	0.127
Agreeableness	-0.036	0.282	48.5 (6.3)	47.4 (6.7)	48.7 (6.5)	0.076

Information on gender was missing for seven respondents.

^aCorrelation between the sum score of dental anxiety (MDAS) and the sum score of each personality trait (NESTA). Pearson's correlation coefficient, two-tailed significance.

^bUnivariate analysis of variance or Kruskal-Wallis test, two-tailed significance.

anxiety correlated positively only with neuroticism ($r = 0.24$, $p = 0.004$), while in females, dental anxiety correlated positively with neuroticism ($r = 0.29$, $p < 0.001$) and negatively with extraversion ($r = -0.13$, $p < 0.001$) and conscientiousness ($r = -0.08$, $p = 0.039$). None of the correlations differed statistically significantly between the genders.

Figure 2 and Table I show the mean scores of five personality traits in the three sub-groups for dental anxiety for total data and according to the gender of participants. In the total data, the scores for neuroticism ($p < 0.001$) and extraversion ($p = 0.039$) differed between dental anxiety sub-groups and dentally anxious subjects had the highest score in neuroticism and the lowest score in extraversion. In male participants, no statistically significant difference in the scores of the personality traits was observed between dental anxiety sub-groups. In females, a significant difference between dental anxiety sub-groups was found in scores for neuroticism ($p < 0.001$) and extraversion ($p = 0.004$). The highest score in neuroticism and the lowest score in extraversion was observed among females with dental anxiety.

Discussion

The study group represented a Finnish population of young adults consisting of first-year university students with a mean age of 25 years from four Finnish universities. To our knowledge, no prior research has been done among university student population using the Modified Dental Anxiety Scale (MDAS) questionnaire and a Finnish version of the NEO-PI personality test, NESTA. The limitations related to our study were (i) that the longitudinal aspect of anxiety was only compared to a 1-year period between the two MDAS tests and (ii) that medical or psychiatric history of the participants was not available. The prevalence of dental fear and its correlation with gender found in our study was in line with previous reports [1,6,8,14–15].

Neuroticism seems to be the only reliable and highly significant factor predicting dental fear both in the dental anxiety and mild dental anxiety group. There was also a tendency that the higher the score in the MDAS test, the lower the score in extraversion. The difference might have been even more evident if we had been able to pick up a group of phobic,

extremely anxious patients. However, in this group the expected 1–2% prevalence of actual dental phobia would have been only ~9–18 cases, i.e. not enough to reach statistical significance.

Interestingly, in the previous study among professional teachers the incidence of psychopathology increased in concert with dental fear, although still within normal limits [8]. The difference became more obvious in the groups of selected patients with severe dental anxiety and their control group [7,9].

Understood as a personality trait, neuroticism can be described as patients' tendency to experience psychological stress and vulnerability to it. This may then be experienced as general anxiety as well as other negative emotions: anger, hostility, shame and depression [17]. Our main result thus confirms the basic similarity of dental anxiety and other anxiety disorders. A practical problem in the dental office is how to recognize a patient with dental anxiety *and* a psychological state that might require the intervention of a psychologist or psychiatrist prior to dental treatment? In cases of mild dental anxiety, professional, painless dental treatment and showing empathy towards the patient is often sufficient to achieve a satisfactory treatment period, whereas among more severely anxious patients the need of treatment of dental phobia associated with psychological problems should first be recognized and the patient referred to professionals in psychology or psychiatry. However, there is currently no such test suitable for clinical use in dentistry for screening such patients. Future studies aimed at developing a suitable screening test for patients with severe dental fear are required.

The age of our cohort deserves some discussion: According to psychiatric diagnostics the onset of disturbed personality traits usually occurs during early adulthood, but may not come to clinical attention until relatively late in life. In addition, personality developments up to middle adulthood may be exacerbated following adverse life-events or unfavourable psycho-social factors. Since our study sample consisted of young adults, further studies with older subjects are needed to examine more specifically the role of age in personality traits and dental anxiety.

Some methodological issues are worth mentioning. The strength of our study is a large sample of Finnish students, which enabled us to evaluate comprehensively the prevalence of dental anxiety in a general population sample of young adults. Dental anxiety and personality traits were assessed by using standardized and widely used instruments, both of which have been shown to be valid and reliable tools in scientific research [10,16]. Some statistically significant correlations were rather small, which is why conclusions concerning the significance of small correlations must be made with great caution.

In conclusion, this study demonstrated that among first-year students of four Finnish universities

neuroticism was the most significant personality trait associated with the risk of dental anxiety, especially among women, and this should be recognized in clinical practice.

Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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