

## Dental Anxiety Among Adults in Turkey

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### Abstract

**Aim:** This aim of this study was to investigate the prevalence of dental anxiety and related factors in a Turkish population.

**Methods and Materials:** The Turkish translation of the Dental Fear Scale (DFS) and the Modified Dental Anxiety Scale (MDAS) were administered to 115 dental patients consisting of 21 subjects who had dental phobia and of 94 patients who did not. The scales were also administered to a non-clinical general population (N=183).

**Results:** The Turkish version of the DFS was internally consistent and reproducible. The scale had strong correlations ( $r=0.80$ ,  $p<0.001$ ) with the MDAS. Female participants scored higher ( $45.2\pm 18.1$ ) on the scale than men ( $38.2\pm 15.7$ ). The DFS had a negative correlation ( $r=-0.25$ ,  $p<0.001$ ) with education level. There was a statistically significant difference between dental phobics and the remaining groups on the DFS total score. At a cut-off point 55, the sensitivity of the scale was 0.80, specificity 0.80, positive predictive value 0.48, and negative predictive value 0.95. Thirty-nine subjects (21.3%) in the general population had total scores above this cut-off point.

**Conclusion:** Dental fear is common in clinical and non-clinical settings in Turkey. The good psychometric characteristics of the DFS among Turkish participants supports its cross-cultural validity.

**Keywords:** Behavioral science, dental fear survey, Turkish population

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## Introduction

Fear of dentistry in general, and especially particular aspects of dental treatment, afflicts a significant proportion of people of all ages and all social classes and for many years has been recognized as a problem area in clinical dentistry.<sup>1,2</sup> Dental anxiety at all levels of intensity has been reported in up to 50% of subjects and often results in total avoidance of dental treatment, irregular dental attendance, or poor cooperation with care providers.<sup>3</sup> Dental anxiety may cause management problems during dental treatment and either partial or total avoidance of treatment. These behavioral problems may lead to reduced dental health. The origin of dental anxiety is most frequently associated with direct traumatic dental experiences in early childhood.<sup>4</sup> Accordingly, early fear acquisition also affects adolescents. Skaret et al.<sup>4</sup> and Milgrom et al.<sup>5</sup> have examined the prevalence of dental fear among adolescents 18 years of age and between the ages of 13-15 years, respectively, and showed the presence of previous painful events and direct conditioning plays a major role in the etiology of severe clinical fear.

Newton and Buck<sup>6</sup> reported, as the behavioral sciences have become an increasingly important component of dental education and research, a wide range of methodological approaches and techniques, especially the questionnaires and behavioral measures, are being used to quantify and describe dental fear. Dental anxiety is most commonly measured using questionnaires and rating scales. Self-administered dental fear questionnaires are of both clinical and scientific importance. The most commonly used instruments are the Dental

Anxiety Scale (DAS) and the Dental Fear Scale (DFS). Whereas the DAS is a general measure with an overall strategy of assessment, the DFS distinguishes between different stimulations.<sup>7</sup> A previous study using the Modified Dental Anxiety Scale (MDAS) demonstrated dental fear is common in Turkey.<sup>8</sup> However, although it is a reliable and valid instrument, the MDAS consists of only five questions which are focused on items most pathognomonic for dental phobia. An assessment tool like the DFS covers a broader spectrum of dental fears so it was used in the present study to obtain additional data to accurately characterize the importance of phobic attitudes toward dental care in Turkey. We also gathered information about previous dental experiences and sociodemographic features of the participants (e.g., gender, age, education, and painful dental experience) which have been shown important for current dental avoidance.<sup>9-14</sup> Thus, the aim of the present study was to determine the prevalence of dental fear reported by adults in Turkey and to determine how it correlates as selected from probable variables.

## Methods and Materials

### Subjects

The studies were carried out in two different populations. First, the DFS was compared to the MDAS in 115 patients who presented to the Outpatient Clinics of Istanbul University, School of Dental Medicine. Ninety-four (81.7%) of these subjects did not express any fear of dentistry, whereas 21 (18.3%) patients had severe fear of dental treatment and were classified independently as having dental phobia by two dentists. This group displayed phobic behavior interfering with dental treatment and accepted treatment only under general anesthesia in a previous and the current visit.

Second, the DFS and MDAS were administered to 183 subjects who were employees of four different industrial companies settled in Kocaeli and Istanbul, Turkey.

Written informed consent was obtained after the study was fully explained to all participants.



### Assessment Measures

In order to establish full congruity between Turkish and English forms, the Turkish form was back-translated into English and was tested for inconsistencies.

**Dental Fear Survey (DFS):** The DFS is a well established scale to identify specific fear stimuli and reactions. The scale, based upon a behavioral approach, has been extensively investigated and found to have good reliability and validity. It consists of 20 items; each question has five answer alternatives rating each item from high (5) to low (1) intensity of reaction.<sup>15-17</sup>

**Modified Dental Anxiety Scale:** The MDAS introduced by Humpris<sup>18</sup> is similar to the DAS but includes an extra question about a local anaesthetic injection. Each question has five scores ranging from 'not anxious' to 'extremely anxious' in an ascending order from one to five. Each question, thus, carries a possible maximum score of five with a total possible maximum score of 25 for the entire scale. The modified version of DAS was used in this study.<sup>19,20</sup>

### Sociodemographic and Medical History Form:

A short history form was used in order to obtain information about sociodemographic features such as sex, age, education, marital status, and income level. Experience of painful events during dental treatment was also asked.



### Statistical Analyses

SPSS 11.0 for Windows statistical software was used for all the analyses. Categorical variables were compared by means of chi-square statistics. The Pearson correlation coefficient was computed for validity. Variance analysis was also used to compare the groups for continuous variables with a Tukey test for pairwise comparison and a Student's t-test was used when appropriate. A

test-retest reliability was calculated using intraclass correlation coefficients. For all statistical analysis, p values were two-tailed and level of significance was set at  $p=0.05$ . Cronbach's alpha was used to determine the internal consistency reliability of all tests. Cronbach's alpha is a correlation coefficient which is based on the average correlation of items within a scale.<sup>21</sup>

### Results

#### Characteristics of the Participants

The demographic data concerning the participants are shown in Table 1. The mean age of the subjects derived from the general population was  $36.0 \pm 7.3$  with a range of 17-60. Their mean education was  $9.5 \pm 4.0$  years. Using the analysis of variance with post hoc Scheffé test, both regular and dental phobic patient groups were found to be older than the general population group ( $F=7.32$  (298;2),  $p<0.001$ ). There was no difference between groups in terms of education. Dental phobics had a higher income level than the remaining groups: ( $F=5.10$  (298;2),  $p<0.01$ ). In the general population, the subjects with experience of painful events had higher DFS scores ( $53.6 \pm 19.5$ ) than the remaining ( $38.0 \pm 15.2$ ) ( $p<0.001$ ).

#### Reliability Measures

The first step was to determine if DFS scores could be accounted for by variables other than group membership as assessed among participants in the general population. There was a significant moderate positive correlation between the DFS and age ( $r=0.25$ ,  $N=183$   $p<0.001$ ) in the general population. Female participants ( $45.2 \pm 18.1$ ) scored higher ( $p<0.005$ ) on the scale than men ( $38.2 \pm 15.7$ ). There were negative correlations (Pearson) between the DFS total score and education ( $r=-0.25$ ,  $N=183$   $p<0.001$ ) but no correlation with economic status.

For all participants ( $N=298$ ), Pearson correlations were calculated between each item and item-deleted DFS scores to establish partial construct validity of the scale. These coefficients were between 0.36 and 0.84. All correlations reached a significance level of  $p<0.05$  or better.

Test-retest reliability was calculated by using intraclass correlation coefficients from the scale scores of 30 people. This group was chosen

Table 1. Sociodemographic characteristics of the participants

	N	Age			Education (years)		Gender (female)		Marital status (married)		Income level (middle)	
		Range	Mean	SD	Mean	SD	N	%	N	%	N	%
General population	183	18 - 60	36.0	7.3	9.5	4.0	90	49.2	140	76.5	105	57.2
Dental phobic patients	21	19 - 56	38.0	11.2	10.8	2.9	14	66.7	18	85.7	17	81.0
Regular dental patients	94	19 - 75	40.9	13.7	10.6	3.5	54	57.4	60	63.8	66	70.0
Total	298	18 - 75	37.8	10.3	9.9	3.8	158	53.2	217	73.1	187	63.0

from a non-clinical population who completed the scale on two occasions separated by a two week interval and who did not receive any dental treatment within this period. The test-retest intraclass correlations (ICC) of 20 individual variables ranged between 0.74-0.94 (95% CI) with a significance of at least  $p < 0.001$ . The test-retest intra-class correlation of the total score was 0.93. These data showed the DFS scores were stable over an approximate two week interval.

Cronbach's alpha coefficients were calculated for the sample as a whole ( $N=298$ ,  $\alpha=0.94$ ) and for each of the subsamples. The subsample findings were: non-phobic dental patients ( $\alpha=0.95$ ), phobic patients ( $\alpha=0.93$ ), and general population ( $\alpha=0.93$ ). These values indicate the DFS is an internally consistent measure across all test samples.

#### Comparison of the Groups

There were high correlations between the DFS and the MDAS ( $r=0.80$ ,  $N=183$ ,  $p < 0.001$ ). These data support the convergent validity of the DFS. Dental phobic patients had the highest score on the DFS with a mean score of  $66.7 \pm 16.1$  (Table 2). The mean DFS scores were  $40.7 \pm 17.5$  and  $41.6 \pm 17.2$  in the remaining groups. A variance analysis was performed to compare DFS scores across these groups. They differed significantly. Pairwise comparisons were then performed with a Tukey test demonstrating significant differences between the phobic group and all other groups.

In the general population the items 'feeling the needle' and 'feeling the drill' had the highest DFS scores.

#### Sensitivity and Specificity

Included in the assessment of sensitivity and specificity were 94 regular outpatients and 21 anxious patients. The four cut-off points used for the DFS scores were  $\geq 45$ ,  $\geq 50$ ,  $\geq 55$ , and  $\geq 60$ . Table 3 indicates DFS sensitivity decreased from 0.95 to 0.66 while specificity improved from 0.64 to 0.82 when changing from the lower to the higher cut-off points. Depending on the cut-off point,  $\geq 55$  the scale gave acceptable negative and positive predictive values (0.48, 0.95). Thirty-nine subjects (21.3%) in the general population had a total score above this cut-off point (equal or above 55).

#### Discussion

A previous study using the MDAS demonstrated dental fears are common in Turkey.<sup>8</sup> However, although it is a reliable and valid instrument, the MDAS consists of only five questions focused on items most pathognomonic for dental phobia. Benefiting from an assessment tool covering a broader spectrum of dental fears for the present study, the DFS provided further observations which implicated the importance of phobic attitudes for dental practice in Turkey. As compared to the MDAS, the Turkish translation of the DFS showed comparable and high inter-item correlation and internal consistency, high

Table 2. DFS total score in various study groups

	N	Mean	SD	Range	Median	Items endorsed (median)	Percent of subjects with a score equal or above 55
General population	183	41.6	17.2	20.0-91.0	37.0	6.0	21.3
Regular dental patients	94	40.7	17.5	20.0-96.0	37.0	5.0	19
Dental phobic patients	21	66.7	16.1	39.0-98.0	65.0	16.0	80

F (2, 298) = 21.57, p < 0.001

Table 3. The number of subjects, sensitivity (SENS), specificity (SPEC), positive predictive value (PPV), and negative predictive value (NPV) according to DFS and cut-off score

Anxiety Scale	Cut-off score	TP	FP	FN	TN	SENS	SPEC	PPV	NPV
DFS	≥45	20	33	1	61	0.95	0.64	0.37	0.98
DFS	≥50	18	22	3	72	0.85	0.76	0.45	0.96
DFS	≥55	17	18	4	76	0.80	0.80	0.48	0.95
DFS	≥60	14	16	7	78	0.66	0.82	0.46	0.91

TP= true positive, FP= false positive, FN=false negative, TN=true negative 30

**Formulas:**

SENS=TP/ (TP+FN)

SPEC=TN/(FP+TN)

PPV=TP/(TP+FP)

NPV=TN/(FN+TN)

test-retest correlation, and convergent validity. However, the small number of patients in our dental fear group led to large confidence intervals. In this study the DFS and MDAS correlated well with one another (r=0.80). This finding is similar to the findings of Moore et al.<sup>3</sup>

There is agreement about patients' psychopathological traits and conditions influencing the expression of their dental fear.<sup>9</sup> According to a report by Moore et al.<sup>22</sup>, dental fear was categorized as a consequence of simple conditioned phobia in 19%, as fear of somatic reactions in 7%, generalized anxiety in 28%, or as distrust of dentists in 46% of cases. To identify dental fear, among various measurement instruments, the DFS is considered to have advantages because of its multidimensionality.

The validity and reliability of the translated versions of the DFS have been tested and confirmed in several studies.<sup>3,7,9,10,23-25</sup> The present study confirmed the DFS showed internally consistent and reproducible results, and also high test-retest correlation suggests the Turkish translation of the DFS is a reliable instrument to use in Turkish population as well. Similar to Johansson and Berggren<sup>7</sup>, the distinction between groups by DFS scores was paralleled in MDAS scores, validating the clinical usefulness of the DFS in our Turkish translation.

Similar to the results of many different anxiety rating scales<sup>3,9-12,26-29</sup>, our results showed gender does affect DFS scores. Women scored higher (45.2±18.1) on the DFS scale than men (38.2±15.7). According to Abrahamsson et al.<sup>12</sup>

and Safer<sup>13</sup>, it is well known women report more dental fear as well as more general emotional distress than men.

According to the report of Berggren and Meynert<sup>14</sup>, a low education level is among the primary reasons for not seeking regular dental care and generating dental fear. This may be due to the social distance between a high-level educated dentist and a less educated dental patient leading to social embarrassment of the patient who worries about difficulty in communication in a physician-patient relationship.<sup>12</sup> In our investigation the DFS total score correlated negatively with education.

As evidenced by the finding of 21.3% of the subjects in the general population had a DFS score above the cut-off point, dental fear is common in Turkey. Haugejorden and Klock<sup>30</sup> and Stamm et al.<sup>31</sup> stated a useful working model should produce a sensitivity of 0.75 or higher and a specificity of at least 0.85 or higher. Based on these results, it may be concluded the Turkish translation of the DFS gave acceptable or near acceptable sensitivity and specificity ratings for groups depending on the cut-off point.

The items 'feeling the needle' and 'feeling the drilling' had the highest DFS scores. The fear of 'feeling the needle' was determined to be due to experiencing pain on injection, the feel of numbness, and the objectionable taste of the spilled anesthetic solution. On the other hand, the most anxiety provoking aspect of the dental hand piece included the sensory vibrations felt during cavity preparation (drilling) despite having a local anesthetic injection.<sup>32</sup> The origin of this choice is not known currently, however, many psychological aspects (e.g., pain induction, symbolical meanings, and triggering of adverse memories-dental or personal) of this phenomenon needs to be investigated in a separate study.

In many previous studies<sup>4,26,29</sup> negative experiences were mentioned by the patients as primary reasons for dental fear. Also, Berggren et al.<sup>34</sup> has shown the acquisition of dental anxiety in many cases may be due to either previous traumatic experiences. Near experiences of pain seem to be more important than previous experiences of pain in the assessment of dental



anxiety.<sup>4</sup> These reports correlate with the findings of our study namely, the subjects with experience of painful events in general population had higher DFS scores than the remaining ( $p < 0.001$ ).

According to Skaret et al. and Milgrom et al.<sup>4,5</sup>, a DFS score of 60 or more indicates high dental anxiety which is close to the cut-off score (55.0) obtained in the present study. The mean DFS score in the dental phobic group among Turkish patients is  $66.7 \pm 16.1$ . In Norway, the USA, and England the mean DFS scores were 44.6, 36.6, and 40.58 in the reference groups, respectively.<sup>15,27,35</sup> Similarly, our mean DFS scores of the general population and regular dental patients were  $41.6 \pm 17.2$  and  $40.7 \pm 17.5$ . These results indicated the cross-cultural validity of the DFS. Moreover, the similarities in the findings suggest dental fear is a universal phenomenon.

### Conclusion

Beyond demonstrating the reliability and validity of the Turkish version of the DFS as an assessment tool, the present study pointed out dental fears are common in Turkey with a prevalence of 21.3% in the general population which demonstrates the universality of this phenomenon. Variables such as the female gender and having a previous adverse (painful) experience were confirmed, but the influence of education surfaced as a significant variable conducive to intervention in order to prevent or modify maladaptive health behavior due to dental fear.

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