

DENTAL FEAR SURVEY: A VALIDATION STUDY ON THE ROMANIAN POPULATION

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Abstract

The first results of a validation study of Dental Fear Survey (DFS) on 198 participants on Romanian population are presented here. DFS is a psychometrical instrument frequently used for measurement of fear associated with specific situations and stimuli of dental treatment. In this study, the descriptive statistics are included and also is determined internal consistency compare to internal consistence reported in the studies in other countries. In the study, dates regarding correlations between DFS subscales and between DFS and other scales are presented. Because dental fear and anxiety are present with all social categories and with all ages, measurement with validated instruments is essential for the establishing of the treatment program adapted to the patient's needs and problems.

Keywords: dental anxiety, dental fear, psychometric proprieties

Introduction

In spite of the significant progress in the modern techniques of eliminating pain (from local anesthesia and analgesics, to sedatives and narcosis), the dental treatment is perceived by most patients as being painful and invasive (Milgrom, Coldwell, Getz, Weinstein, & Ramsey, 1997). Even though the achievements resulted both from the research and the practice on how we communicate with patients, and on how pain can be controlled are important, the anxiety and the dental fear continues to raise significant

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problems both to the patients and to the dentist. In fact, it has been proved that the attitude toward the dentist presents the most powerful linear relationship with dental anxiety (Doerr, Lang, Nyquist, & Ronis, 1998). Anxiety with its numerous clinical manifestation, is directly linked with pain and its previous experience. Negative dental experiences are not necessarily a direct cause of physical traumas, but can be a consequence of the fact that the dentist, because of his/her poor communicative abilities, is not able to establish a proper interpersonal relationship with the patient. As proved during a national survey in the USA, more than two thirds of the surveyed dentists use insufficient communicative techniques and only a quarter of the dentists use any of the techniques in the teach back method or patient friendly practice domains (Rozier, Horowitz, & Podschun, 2011).

The patients diagnosed with dental anxiety put off or give up dental treatment. The fear of the dentist influences negatively the treatment and can even make the patients to postpone or even avoid it, even though the treatment is vital. Postponing leads of the problem and, consequently to an intensification of the pain. When the pain becomes worse or even unbearable, the patient will appeal to dental medicine services again. He/she attributes the pain and the discomfort to the doctor and not to his/her tendency to avoiding or postponing. The visit to the dentist often represents for the patient a stressful moment preceded of pressure and vegetative dystonia. The patient presenting anxiety towards dental treatment will have the following symptoms structured at the level of three dimensions: physiological, cognitive and behavioral (Sarbu, *apud* Rotaru, 2001).

The physiological dimension: vegetative dystonia manifested by cardiovascular modifications (palpitations, tachycardia), respiratory modifications (dyspnea, tachycardia), gastrointestinal modifications (epigastric spasms, acceleration of intestinal transit) all these determined by the activation of the sympathetic nervous system during dental treatment.

The cognitive dimension: an overestimation of the expected pain, fear that the tissues might be accidentally injured during dental treatment, the fear of suffocation during the procedures of taking the mould, the fear of syncope or death with cardiovascular patients, the fear of severe bleedings with patients presenting homeostasis disorder.

The behavioral dimension: the absence of visual contact, an uncomfortable posture while sitting in the dental armchair, the difficult to

opening of the mouth, loquacity in view of delaying *the treatment*, and avoiding the dental treatment as much as possible by resorting to different strategies (not be punctual, canceling the appointment at the last minute).

The dental anxiety is present with all social categories and with all ages. Between 6 to 15% of the world's adult population suffers from avoidance of dental care due to high dental anxiety and phobia (Eli, 1992). The high prevalence of dental anxiety is reflected in the high costs determined by the fact that people avoid the treatment and require it only in cases of emergency or when the necessary restorations are extremely expansive (Malamed, 2010). Even though it has been reported a constant maintenance of the level of dental anxiety in the conditions of an increase of the level of general anxiety, its impact on the general health of the patient, on his/her self-esteem, on his/her social and professional performance should not be ignored (Cohen, Fiske, & Newton, 2000). The studies published in medical journals have shown that a significant percentage of the patients suffering from dental anxiety, attribute it to a traumatic or negative incident in their childhood (Locker, Shapiro, & Liddell, 1996). According to a recent study it is very likely that the dental fear is transmitted to other members of the family, too. Family members' levels of dental fear are significantly correlated, and fathers' dental fear is a mediating variable in the relationship between mothers and children's fear scores (Lara, Crego, & Romero-Maroto, 2011).

The findings have shown that the high level of fear and anxiety are correlated with such factors as: a high frequency of oral symptomatology, the aesthetic and the malfunctioning of the oral cavity, long intervals between the visits to the dentist (Sohn & Ismail, 2005). A recent study performed in view of filling in the gaps in the scientific research regarding the role of somatization as significant variable associated with an excessive visiting of the dentist, has investigated the role that such a feature might have in comparison with dental visiting and dental fear. The authors are of opinion that the overconcentration on the physical symptoms could lead to a significant increase in dental fear as result of considering the dental treatment experience as more traumatic (Armfield, Pohjola, Joukamaa, Mattila, Suominen, & Lahti, 2011). The measurement of the somatisation has been performed with the help of the Symptom Check List (SCL-90), of which authors have used twelve items which suited the object of the research. The dental fear has been assessed on only one item, while dental visiting has been assessed on the basis of a

questionnaire about the time lag from the last visit to the dentist and the common reasons given for dental visiting. The results of the multinomial logistic regression analyses, after controlling the age, the gender, and the level of education, indicate significant levels of positive association of the somatisation both with dental fear and with symptomatic dental visiting. However, dental-visiting frequency and somatisation do not correlate significantly. The findings are in accordance with the hypothesis of the study on the role of somatisation in dental fear development.

Assessing the prevalence of the dental fear and the dental phobia in comparison with 19 other common fears and with the subtypes of specific phobia according to the Diagnostic and Statistical Manual of Mental Disorders (DSM IV-TR; A.P.A., 2000), has been the research work of some well-known researcher in this field. The findings, obtained on a survey performed on 1958 adult Dutch people with ages between 18 and 83, have been used in order to evaluate the differences according to gender, age, prevalence, severity, presence of stressful memories about events associated with fear. The phobias have been assessed on DSM-IV-TR, and the severity of the fears has been assessed on analogue visual scales. The preponderance of dental fear was with 24.3% lower than the fear of snakes (34.8%), of heights (30.8%) or of physical injuries (27.2%). Of the phobias, the dental one was the most common (3.7%) followed by the phobia about heights (3.1%) and about spiders (2.7%). The fear of dental treatment has been associated with females and assessed as being the most severe one, and it has been mostly associated with intrusive re-experiencing (49.4%). The findings show that the dental fear is a considerably severe and stable condition. That's why as essential we consider performing similar studies in other countries.

Starting from these premises, identifying the dental fear and anxiety is consider essential and vital for the establishing of the treatment program adapted to the patient's needs and problems. The researcher's goals to build and validate psychometric instruments in order to determine the frequency, the intensity, the maintenance or the context in which the signs and the symptoms of this disorder occur, respond to the practitioners' requirements to have access efficient measurement instruments.

After very laborious studies published in first-rate scientific journals, (Kleinknecht, Klepac, & Alexander, 1973; Kleinknecht & Bernstein, 1978), the Dental Fear Survey has been established psychometric trials, for the assessment

of the fear manifested in different moments and situations typical of the dental practice. DFS is based on a theory of learning and is much more relevant than other traditional instruments, regarding both the understanding and the assessing and treating of the dental anxiety and fear (Fischer & Corcoran, 2007). The factorial analysis identified three stable factors and confirmed the fact that these three aspects are the most important elements of the dental anxiety (Kleinknecht, McGlynn, Thorndike, & Harkavy, 1984). DFS consists of three subscales in which we identify these factors: the first one is related to a pattern of avoiding the dental treatment and to the anticipatory anxiety, the second one represents the fear associated with the stimuli and the procedures during treatment and the third one the psychological reaction or the arousal during treatment.

The original version of DFS contained 27 items and the present one 20 items formulated in such a way as to identify the specific and unique answers to a variety of stimuli correlated to the dental activity. Thus, items 1 and 2 assess the dental situations; items 3-7 assess the psychological symptoms which occurred during treatment; items 8-19 assess fear, anxiety and unpleasant states associated to different situations specific to the dental intervention. Item 20 offers a global assessment of the dental fear. The items 1-7 refer to the frequency of the situations, of the emotions and of the reactions to dental treatment. They are assessed on a scale with 5 points where 1 means never, 5 means nearly every time. The items 8-20 refers to the intensity of the symptoms of fear and anxiety which occurred in different situations specific to the dental treatment. They are assessed on a scale of 5 points where 1 means no fear and 5 means extreme fear.

Administration and scoring: the DFS takes between 2 and 5 minutes to complete. The respondents receive information about the content of the questionnaire (different situations, emotional states and reactions associated with the dental activity). Then they are asked to assess their own emotions and reactions related to the content of the items and to circle for each of the 20 items the number (1, 2, 3, 4, 5) which best corresponds to their reactions and states. After their confirmation of having understood the requirements, the respondents assess on a scale of 1 to 5 the intensity with which they experience every symptom and circle of corresponding figure. To calculate the score for each subscale means adding the values for each corresponding item. The total

score can be determined either by adding the scores for three subscales or by adding the values for each item of the DFS.

No precise data relating to fidelity are published, but different studies have reported high value of the coefficient α and of the coefficients of the correlation test-retest. (Antony, Orsillo, & Roemer, 2004; Fischer & Corcoran, 2007). Also, according to the analysis of the psychometric characteristics of the most widely used instruments for the measurement of the anxiety and of the pain, the DFS is recommended for use in research (Schuurs & Hoogstraten *apud* Newton & Buck, 2000).

Objectives

In this study we have performed the first implementation on Romanian population and we have identified the psychometric characteristics of DFS. We have found that the psychometric characteristics of the DFS are similar to those presented by the authors of the trial, and to those in the validation studies performed on different cultures.

Method

The validation study for the DFS was performed on 198 participants both from rural and urban areas. The panel was rather heterogeneous from the point of view of their education, being formed of high school students, students, adults with or without university degrees. The age of the participants was between 15 and 35 and the age average of 19.75 and $SD=4.43$. There were 94 males (age average = 19.70 and $SD=4.38$) and 104 females (age average= 19.80, $SD=4.49$).

Procedure

As the implementation study of DFS is a component part of the research work for the PhD degree, having as theme the Management of the Anxiety and of the Dental Fear, the participants filled in the Current Thoughts Scale (CTS) (Heatherton & Polivy, 1991; Marian, 2009), Trimodal Anxiety Questionnaire/Somatic, Cognitive, Behavioral Anxiety Scale (Lehrer &

Woolfolk, 1982) Modified Dental Anxiety Scale (Corah, Elliot, Gale, & Illing, 1969), McGill Pain Questionnaire (Melzack, 1975) and Dental Fear Survey in one session of testing. The evaluation was achieved mostly individually and under the protection of the law of anonymity but without time limit. In order to determine the statistical markers, we have analyzed the results of the whole panel (198 participants).

Results

As to differences between males and females were not significant for the subscales of the DFS, the average and the standard deviation were calculated for the whole panel. Thus, for the subscale *Tendency to avoid dental treatment and anticipatory anxiety* the average is 17.23, standard deviation of 8.5, the minimum value of 9 and the maximum value of 43; for the subscale *Fear reaction during treatment* the average is of 14.38 , the standard deviation of 7.03 , the minimum value if 6 and the maximum value of 30; for the subscale *Physical arousal*, the average is 8.70 , the standard deviation of 3.62 , the minimum value of 5 and the maximum value of 22; the average for the total score of the DFS is of 40.57 , the standard deviation of 17.43 , the minimum value of 20 and the maximum value of 93 (Table 1).

Similar results have been obtained in studies performed in other culture on similar panels. Thus, recent study has studied the identification of the psychometric characteristics of some of the most widely-used instruments for the measurement of the dental fear, the Modify Dental Anxiety Scale (MDAS), the Dental Fear Survey (DFS) and the Needle Survey (NS) on a Spanish population, the greatest ethnic minority in the USA. (Coolidge, Chambers, Garcia, Heaton, & Coldwell, 2008). The average total score of the DFS calculated on the participants panels was of 44.11 (SD=16.61) for the English-speaking panel, of 39.30 (SD=15.37) for the Spanish speaking panel, of 44.32 (SD=20.51) for the English-speaking students panel, of 40.27 (SD=13.31) for the Spanish speaking students panel and of 33.39 (SD=14.69) for the Spanish patients in the dental clinic. The reports on panels made up of persons suffering from dental phobia present on average of the DFS of 75.8, SD=12.9 and 76.6, SD=14.3 (Moore, Berggren, & Carlsson, *apud* Antony et al., 2004), respectively, 76.6, SD=14.3 (Johansson & Berggren, 1992).

Table 1. Dental Fear Survey: Descriptive statistics

Subscale	Number of items	N	M	SD	Min.	Max.
Dental avoidance	9	198	17.23	8.50	9	43
Specific Fear	6	198	14.38	7.03	6	30
Physical arousal	5	198	8.70	3.62	5	22
Total score of DFS	20	198	40.57	17.43	20	93

Internal consistency

On the panel investigated in this study, the internal consistency on the DFS has presented high values for the three subscales and for the global score, as shown in Table 2. Thus, α Cronbach has a value of .95 for the total score, of .92 for the dental avoidance and anticipatory anxiety subscale, of .93 for the fear associated with particular procedures and stimuli subscale of .85 for the physical arousal symptoms during dental treatments subscale. The results are similar to other results in similar previous studies, of which we would like to present a few.

On the students panel, McGlynn, McHeil, Gallagher, & Orano (1987) determined internal consistency with values of .90 for the total score, of .91 for the dental avoidance and anticipatory anxiety subscale of .91 for the fear associated with particular procedures and stimuli subscale and of .81 for the physical arousal symptoms during dental treatment subscale. When retesting the same respondents' panel 8-13 weeks later, the authors calculated a test-retest fidelity coefficient of .88 for the global score, of .87 for the dental avoidance and anticipatory anxiety subscale, of .83 for the fear associated with particular procedures and stimuli subscale and of .74 for the physical arousal during dental treatment subscale. The results prove the stability of the trial.

Table 2. Internal consistency of Dental Fear Survey

Subscale	Internal consistency	
	N	α Cronbach
Dental avoidance	198	.92
Specific Fear	198	.93
Physical arousal	198	.85
Total score of DFS	198	.95

Coolidge et al. (2008) reported an internal consistency of the entire scale of the DFS similar to the one obtained on the Romanian panel. The value of α Cronbach was found between .92 (the Spanish speaking panel) .97 (the English-speaking panel), and the test-retest correlation coefficient showed the highest value of .86 for the Spanish speaking panel.

In table 3, regarding the three DFS subscales, the intercorelations are different from the intercorelations of the fidelity coefficients, these fact suggest that between these three there is an obvious distinction.

Table 3. Correlation matrix between DFS subscale

Subscale	Dental avoidance	Specific Fear	Physical arousal	Total score of DFS
Dental avoidance	-			
Specific Fear	.80**	-		
Physical arousal	.64**	.58**	-	
Total score of DFS	.95**	.92**	.76**	-

Note: ** p < 0.01

In table 4, it is shown that the subscales and the total score for DFS presents the highest correlation with MDAS. From DFS scales, the physical arousal scale correlates the most with MDAS. The same order is also repeated between the DFS subscales and total score TAQ and the McGill Pain questionnaire score. The obtained results correspond with our expectancies, with the results of other research and with the theories on which the above mentioned scales fundament.

Table 4. Correlation matrix between DFS, and CTS, TAQ, MDAS, McGill PQ

Subscale	CTS perf.	CTS social	CTS aspect	CTS total	TAQ som.	TAQ cog.	TAQ beh.	TAQ total	MDAS	McGill PQ
Dental avoidance	-.086	-.078	-.020	-.080	238**	252**	366**	279**	597**	265**
Specific ear	-.092	-.168*	-.064	-.141	280**	280**	312**	347**	617**	254**
Physical arousal	-.108	-.190**	-.189**	-.213**	384**	305**	369**	435**	622**	384**
Total DFS	-.100	-.146**	-.078	-.141	319**	252**	383**	373**	672**	314**

Note¹: * p<0.05; **p<0.01

Note²: CTS - Current Thoughts Scale; TAQ – Trimodal Anxiety Questionnaire; MDAS – Modified Dental Anxiety Scale; DFS – Dental Fear Survey; McGill PQ - McGill Pain Questionnaire.

Validity

The validity studies presented in medical and psychological journals present proofs related to the construct and criteria validity of the DFS. This would be presented in a synthesis.

The factor analysis studies made by authors (Kleinknecht et al., 1984) have identified three factors representing: 1) patterns of dental avoidance and anticipatory anxiety; 2) fear associated with particular procedures and stimuli; 3) physical arousal symptoms during dental treatment.

Johansson and Berggren (1992) analyzed dental fear and its occurrence among patients using two psychometric instruments: The Dental Fear Survey (DFS) and the Corah Dental Anxiety Scale (DAS). In this study, the participants were patients who attended a dental emergency clinic (EMC), separated into high- and low- fear individuals, and another sample of patients who were receiving treatment at a specialized dental fear clinic (FEC). Analysis showed that DFS values clearly distinguished between the groups of high- and low- fear individuals and also between the FEC group and EMC groups. Data also showed that dental fear levels were in correspondence with previous results, and the correlation between the DAS and the DFS was high ($r = 0.92$). The difference between the mean item scores on the dental situation dimension was not significantly different between high-fear EMC and FEC individuals, in contrast to the DFS avoidance and arousal dimensions, which indicated that the behavioral and physiologic effects of the dental situation among high-fear EMC and FEC patients were different, while the evaluation and appraisal may have been corresponding. FEC patients were interpreted as showing a more phobic behavior, and this was better captured in the DFS than in the DAS.

Hakeberg and Berggren (1997) discussed the dimensions of the DFS among patients with dental phobia. DFS was measured by 313 dental-phobic individuals, using an exploratory factor analysis (EFA) and a confirmatory factor analysis (CFA) in order to show dimensions and latent variable. A five-factor structure was recorded by the EFA, using the following items as: 'Avoidance of dental care', 'Physiologic arousal during dental treatment', 'Anticipatory anxiety while waiting for dental treatment', 'Fear of the injection needle', and 'Fear of the drill'. The total explained variance of the EFA was 63%. The CFA analysis recorded a factor structure with 6 latent variables including a general dental fear factor loading on all 20 items together with the 5

factors mentioned earlier. This model was interpretable in all its dimensionality. These factor analyses have shown a different factor structure of the DFS in this sample of dental-phobic individuals as compared to the dimensions reported from previous research in samples presenting nonclinical populations.

McGlynn et al. (1987) examined factor structure, stability, and internal consistency of the DFS by administering the 20-item scale to 3,917 college students. DFS was also administered to 371 college students, at the beginning and end of a semester. Temporal stability values and internal consistency coefficients were calculated using data from the two administrations, for total scores and for 3 factor-analytically derived subscale scores among all Ss and among high fear Ss. The previous results are used to support the argument that the DFS provides for adequate assessment at the questionnaire level. Factor scoring coefficients and normative data are provided to facilitate use of the DFS in research with nonclinical populations.

McNeil and Berryman (1989) identified components of dental fear in adults. Using a normative sample of 285 undergraduates, this study reveals the functional relatedness between dental fear and multiple other fears. Within verbal report area, fears about social contact, pain, mutilation and being closed-in were assessed and studied as possible components and/or concomitants of the dental fear construct. The DFS total score was used as a criterion variable by multiple regression analyses on these variables. The most significant predictor of dental fear was fear of pain for both genders, followed by fear of being closed in. Fear of mutilation was the next strongest determinant only among females. Further investigation is required for the possible role of social fears in dental fear, since it has not been confirmed. There may often be a moderate degree of functional dependence between dental fear and other fears.

Milgrom, Kleinknecht, Elliott, Hsing, and Choo-Soo (1990) carried out a cross-cultural cross validation of the DFS in South East Asia. This study used two groups of adults from Singapore (university students and military conscripts), and was designed as a cross-cultural replication and cross validation of the DFS. Factor analysis of the DFS revealed factor structures highly comparable to one another as well as to those obtained in the U.S.A. Results comparable to those found in Western cultures were found in behavioral and physiological fear assessment during exposure to simulated dental treatment. Significantly lower DFS was found among students who had visited a dental office within the past year than those who had avoided dental

treatment. This was not the case among military conscripts, whose levels of dental fear were lower overall. The conclusion was that the DFS is factorial stable and it can be generalized to the South East Asia culture.

Cesar, de Moraes, Milgrom, and Kleinknecht (1993) in a study, cross-validated a Brazilian version of the DFS. Instruments such as the DFS should be cross-validated before they are used in countries and cultures dissimilar to the one in which it was developed, that is, in the USA. This study used Brazilian university students and proved that the DFS performs in this sample very much as it does in other samples, being, thus, a valid indicator of dental fear at least among Brazilian university students.

Kvale, Berg, Nilsen, Raadal, Nielsen, Johnsen, and Wormnes (1997) validated the DFS and the DBS on Norwegian population. This study uses a sample of Norwegian people to validate the Kleinknecht's Dental Fear Scale and the Getz's Dental Belief Survey, testing their ability to discriminate fearful and regular patients and to correlate them. Both scales proved to be highly reliable, as most fearful and regular patients were assigned correctly to their groups using both instruments. The conclusion is that both instruments are valid and they seem measure largely the same concept. Avoidance of dental treatment was the most important predictor for both instruments.

Coolidge et al. (2008) evaluated the psychometric properties of Spanish-language adult dental fear measures. Since Hispanics are the largest ethnic minority in the US, sound measures of dental fear for this ethnic group are necessary. This is a report on the psychometric properties of Spanish-language versions of two common adult measures of dental fear (Modified Dental Anxiety Scale, MDAS; Dental Fear Survey, DFS), as well as a measure of fear of dental injections (Needle Survey, NS). The measures were administered in Spanish versions to different groups of people (students, people attending a festival, dental patients); the instrument was also measured on English-speaking adults and students in the same situations as the Spanish-speaking respondents, to compare the performance of the English and Spanish measures in the same populations. The results proved evidence for construct validity in all the three measures. There is evidence for the internal reliability, construct validity, and criterion validity for the Spanish versions of the three measures, and evidence for the test-retest reliability of the Spanish versions of the DFS and NS.

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The validation of DFS is part of a more complex PhD research program in which the management of dental anxiety through psychological and medical interventions is being experimented. Results of factor analysis exploratory and factor analysis confirmatory on the 198 participants sample are not concordant with the results reported by the authors of DFS. We assume that these incongruities can be explained by the dimension of the sample or by cultural factors. In the future the number of participants included in the sample will be enlarged so that the factor analysis can be repeated.

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