



MODIFIED DENTAL ANXIETY SCALE: A VALIDATION STUDY ON COMMUNITIES FROM THE WEST PART OF ROMANIA

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Abstract

To test the Romanian version of the Modified Dental Anxiety Scale (M.D.A.S.), the instrument was translated into Romanian and administrated to 198 young adults. The M.D.A.S. is a brief self-complete questionnaire consisting of five questions and it is easily scored by summing individual item scores (from a=1 to e=5), for a total score ranging from 5 to 25. The M.D.A.S. has been translated into a number of world languages, many of which have reported adequate psychometrics. The objectives of our study were to check the Romanian translation of the M.D.A.S., to determine its reliability and validity in a sample from the Western part of Romania, and to provide norms to clinical practice. The M.D.A.S. was applied with other psychological tests, the Current Thoughts Scale (C.T.S.), the Trimodal Anxiety Scale (T.A.Q.), the McGill Pain Questionnaire, (McGill P.Q.) and the Dental Fear Survey (D.F.S.). Our hypothesis was the existence of possible correlations between these scales. Since dental anxiety is present with all social categories and with all ages, accurate assessment is one of the premises of the intervention for reducing the prevalence and intensity of dental anxiety. For this, measurements with adequate psychometrics are needed, applied in a doctor - patient communication context based on trust and collaboration.

Keywords: dental anxiety, translation, assessment, psychometrics, correlations

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Introduction

The results of psychological and behavioral studies and the modern techniques of diminishing or eliminating pain are introduced in dental education and clinical practice, yet many people are still avoiding dental treatment due to fear and anxiety and because the dental intervention is perceived as being invasive and painful (Milgrom, Coldwell, Getz, Weinstein, & Ramsey, 1997; Humphris, Dyer, & Robinson, 2009). Even though achievements provided by both research and experiences on communication with patients about how the pain can be controlled are important, anxiety and dental fear continue to raise significant problems both to the patient and to the dentist. Yet communications skills are insufficient applied by most dentists (Rozier, Horowitz, & Podschun, 2011).

One first method to identify and to reduce dental anxiety could be adequately evaluating of the condition and elaborating strategies for anxiety management. An accurate measurement of dental anxiety is necessary for attending this tool. The evaluation of dental anxiety and dental fear is performed with different methods, including several psychological tests (Antony, Orsillo, & Roemer, 2004).

A referential review of main the tests for anxiety, fear and pain measurement in dentistry has been realized by Newton and Buck (2000) The authors established that the Corah Dental Anxiety Scale (D.A.S.) was the most widely used scale, and recommended D.A.S. use in clinical dental setting to measure anxiety in adults. To measure anxiety in adults as part of the research, they recommend Kleinknecht's Dental Fear Survey (Newton & Buck, 2000). Schuurs and Hoogstraten (1993) reviewed six scales of adult dental anxiety (D.A.S. was included) and concluded that the most sensitive, reliable and valid measure was Kleinknecht's Dental Fear Survey. Given the greater range of possible scores using this measure, Kleinknecht's Dental Fear Survey may be a more sensitive tool to use in research.

In our recent study we tested the Romanian version of the Dental Fear Survey (DFS) (Kleinknecht, Klepac, & Alexander, 1973; Kleinknecht & Bernstein, 1978), and correlated its subscales with the Current Thoughts Scale, C.T.S. (Heatheron & Polivy, 1991; Marian, 2009), the Trimodal Anxiety Questionnaire T.A.Q. (Lehrer & Woolfolk, 1982), the Modified Dental Anxiety Scale, M.D.A.S. (Humphris, Morrison, & Lindsay, 1995), McGill Pain Questionnaire (Melzack, 1975). The total score of the D.F.S. presented the

highest correlation with the M.D.A.S. From D.F.S. scales, the physical arousal scale correlated the most with M.D.A.S. The same order is also repeated between the D.F.S. subscales and the total score and subscales score of T.A.Q., and the McGill Pain questionnaire score. The obtained results corresponded with our expectancies, with the results of other research and with the theories on which the above mentioned scales fundament (Mărginean & Filimon, 2011).

The current form of the M.D.A.S. witch is the base of our research, is modelled on the original D.A.S. (Corah, 1969; Corah, Gale, & Iling, 1969), a brief, 4 items, easy-to-administer, designed to measure anxiety about dental treatment. The dental anxiety is conceptualized as the patient's response to the specific dental situations: emotional response to the prospect of a dental visit the previous day, then when in the waiting room, receipt of drilling, and scaling. The D.A.S. has been rated with two large groups of undergraduate psychology college students during courses (998 men and 1 105 women). The overall mean for the D.A.S. was 9.07 with differences of only .44 between the two groups, though the difference was reported as statistically significant. Women tend to score higher than men. The D.A.S. is easily scored by summing individual item scores (from a=1 to e=5) for a total score (from 4 to 20).

The internal consistency of D.A.S. resulted very well (reliability coefficient was .86). The D.A.S. has good concurrent validity, with significant correlations with several measures of stress and anxiety related to dental work. The D.A.S. is also reported as being sensitive to changes in dental anxiety as results of treatment (Fisher & Corcoran, 2007) although it may not be as sensitive as other measures (Newton & Buck, 2000). The D.A.S. is widely used, but has been criticized as exhibiting a range of total scores that are too narrow to be used effectively in clinical studies; by increasing the number of possible responses from four to five and by introducing an additional item that asks about responses to administration of local anesthetic and by a change in the response format, the M.D.A.S. helps to rectify this problem. M.D.A.S. is a brief, 5 item questionnaire with a consistent answering scheme for each item ranging from "not anxious" to "extremely anxious". It is summing together to construct a Likert scale with a minimum score of 5 and a maximum of 25 (Humphris et al., 1995). The M.D.A.S. is based on the original D.A.S. for which conversion tables have been published to compare values between the two instruments (Freeman, Clarke, & Humphris, 2007).

The M.D.A.S. was originally developed in English, and researchers have reported good psychometric properties in various English-speaking countries such as England, Scotland, Ireland, and Wales. Mean scores are provided for phobic and non-phobic patients (Humphris, Freeman, Campbell, Tuutti, & D'Souza, 2000; Humphris et al., 1995). The completion of the questionnaire does not increase the patient's anxiety, but it can reduce the anxiety level in the practice settings (Humphris, Clarke, & Freman, 2006; Humphris & Hull, 2007). Other researchers have used translated versions in additional countries and languages, and report that the scale appears to be reliable and valid in these translations/local versions, as well (Acharya, 2008; Coolidge, Arapostathis, Emmanouil, Dabarakis, Patrikiou, Economides, & Kotsanos, 2008; Coolidge, Chambers, Garcia, Heaton, & Coldwell, 2008; Coolidge, Hillstead, Farjo, Weinstein, & Coldwell, 2010; İlgüy, İlgüy, Dinçer, & Bayirli, 2005; Pohjola, Lahti, Vehkalahti, Tolvanen, & Hausen, 2008; Tunc, Firat, Onur, & Sar, 2005). Those who score 19 or higher are considered to have high levels of dental fear (Humphris et al., 2009).

Our investigation suggests that there hasn't been an adaptation study of the D.A.S. or the M.D.A.S. in Romania. There is only a translation used in clinical practice, without specifying norms, scoring or psychometrics

Objectives

The objectives of our study are: to check the Romanian version of the MDAS and its reliability and validity and to identify correlations between MDAS and other questionnaires used in psychological research and practice for measure self esteem, somatic, cognitive and behavioral anxiety, pain, and dental fear.

Method

Participants

The validation study for the M.D.A.S. was performed on 198 participants with both urban and rural settings/communities from the Western part of Romania. The sample was rather heterogeneous from the point of view of the education, consisting of high-school students, students, adults with or without university degrees. The age of the participants was between 15 and 35 (m age=19.75 and SD=4.43). There were 94 males (m age=19.70 and

SD=4.43) and 104 females (m age=19.80 and SD=4.49). Data were completed by all participants but one, who was excluded from the sample because of some socio-demographic data missing. All the participants gave their informed consent.

Procedure

As the implementation study of the M.D.A.S. is a component part of the research work for the Ph.D. degree having as theme the management of the anxiety and dental fear, the participants filled in the Current Thoughts Scale, C.T.S. (Heatheron & Polivy, 1991; Marian, 2009), the Trimodal Anxiety Questionnaire/Somatic, Cognitive, Behavioral Anxiety Scale, T.A.Q., (Lehrer & Woolfolk, 1982) the Modified Dental Anxiety Scale, M.D.A.S., (Humphris et al., 1995), the McGill Pain Questionnaire, McGill P.Q. (Melzack, 1975) and the Dental Fear Survey, D.F.S. (Kleinknecht et al., 1973; Kleinknecht & Bernstein, 1978) in one assessment session. The evaluation was achieved mostly individually and under the protection of anonymity, without time limit. In order to determine the statistical markers, we have analyzed the results of the whole sample.

The M.D.A.S. was translated from English into Romanian by all authors, and versions were analyzed in order to consensus. The Romanian-language final version of the M.D.A.S. was back-translated into English by a translator and verified for inconsistency. Although the scale was translated in many languages, a Romanian adapted version has not been published yet. A similar situation has been recently pointed out and overtaken by the Italian researchers for the D.A.S.

Data were analyzed using SPSS v 17. The scale was factor analyzed with principal factor method.

Results

Descriptive statistics

As the difference between males and females was not significant for the M.D.A.S., the mean and standard deviation were calculated for the whole sample (Table 1). The M.D.A.S. score in our sample ranges from 5 to 24, with means $m=9.30$, standard deviation, $SD=4.13$. The score distribution presents some particular aspects: 43.9% of participants had a score between 5 and 7,

22.2% between 8 and 10, 13.6% between 11 and 13, 15.2% between 14 and 16, and 5.1% had scores higher than 17; just 2.03% (4/197) from the entire sample present high level of anxiety (from 19 to 24).

We point out that the Romanian sample extracted by simple randomization is made of adolescents and young adults. The results differ from the ones in other studies: the averages are smaller, the prevalence is lower. The answers are influenced by the samples' composition, the and probably by cultural factors.

In a study which aimed to determine dental anxiety among Turkish patients and to assess psychometrics of the D.A.S. and M.D.A.S., the prevalence of dental anxiety was found to be 9.9% (29/294) for Corah's D.A.S. at the cut-off point ≥ 15 and 8.8% (26/294) for the M.D.A.S. at the cut-off point ≥ 19 (İlgüy et al., 2005). In an English research which aimed to produce confirmatory evidence of psychometrics for the M.D.A.S., to provide up-to-date U.K. representative norms for the general public, and to determine the nature of the relationship between dental anxiety and age, the authors established the same value 19 and above to indicate high dental anxiety. The level of high dental anxiety in the English sample was 11% and is comparable to other reports from local or regional community surveys (Humphris et al., 1995; Humphris et al., 2009).

In a study realized for identifying psychometric properties of Spanish-language versions of two common adult measures of dental fear, Modified Dental Anxiety Scale (M.D.A.S.) and Dental Fear Survey (D.F.S.), authors were reported descriptive statistics (Coolidge et al., 2008). For the M.D.A.S., means (m) and standard deviation (SD) in different samples were: English-speaking Community $m=12.64$ ($SD=4.94$), Spanish-speaking Community, $m=13.05$, $SD=4.94$, English-speaking College Students, $m=13.47$, $SD=5.94$, Spanish-speaking College Students, $m=11.87$, $SD=5.03$, Spanish-speaking Patients, $m=11.06$, $SD=4.49$. We notice that means and standard deviations were higher than in Romanian sample.

Table 1. Modified Dental Anxiety Scale: Descriptive statistics and internal consistency

Scale	No. of items	N	m	SD	Min.	Max.	Internal consistency
MDAS	5	197	9,30	4,13	5	24	.90

Validity

One preliminary examination of the correlation matrix indicates that all the MDAS items are positively intercorrelated, the sphericity Barlett test is statistically significant $\chi^2(10) = 643.299$, $p < .0001$, which sustains the factorial analysis utility. The samples' adequate extend was tested with the Kaiser - Meyer - Olkin (KMO) method, the result was a .849 score, which demonstrates that the sample fulfils the basic conditions to use factorial analysis.

Considering the similar studies witch sustains the existence of a single factor of dental anxiety, we applied the factorial analysis with the method of direct oblimin factor rotation, which allows factors to correlate at various intensities. We identified a factor that represents 72.699% of the data variation (Table 2). After the rotation we can notice the strong influence of a single factor.

Table 2. Total variance explained of the factors

Component	Initial Eigenvalues			Rotation
	Total	% of Variance	% Cumulative	Total
1	3.653	72.699	72.699	
Items	Matrix of the factorial structure			Communalities
MDAS 1	.837			.700
MDAS 2	.880			.774
MDAS 3	.913			.833
MDAS 4	.853			.728
MDAS 5	.774			.599

In figure 1 we represent each of the 5 possible factors on the abscise, and the eigenvalue is represented on the ordinate.

Factor analysis of the M.D.A.S. is realized in other studies, from which we evoke a few with similar results.

Coolidge, Chambers, Garcia, Heaton, and Coldwell (2008) developed a Spanish-language version of the M.D.A.S. for use with Hispanics in the United States, and found that it had good construct validity, measured by correlations with the Spanish version of the Dental Fear Survey (D.F.S.) in samples of Spanish-speaking students, Spanish-speaking dental patients, and Spanish-speaking adults who attended two Hispanic festivals. In our study, correlations between M.D.A.S. and D.F.S. were between .67 ($p < .01$) (D.F.S. total score)

and .59 ($p < .01$) (D.F.S. dental avoidance subscale). The Spanish M.D.A.S. also displayed good criterion validity (determined by comparing M.D.A.S. scores with observable anxiety during dental treatment) and internal reliability (coefficient alpha was between .80 and .91). The new evidence for the construct validity of M.D.A.S. in Hispanic samples is added by the significant relationships between dental attendance and questionnaire scores, as well as by the difference in caries severity seen in participants with high fear (Coolidge et al., 2010).

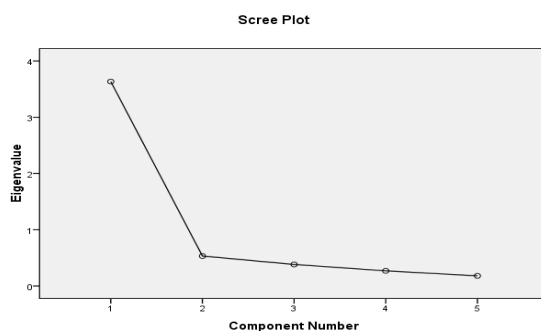


Figure 1. Eigenvalues resulting from analysis

In their research, Humphris, Dyer, and Robinson (2009) identified a clear unity factor structure by using exploratory factor analysis and demonstrated that the M.D.A.S. can be considered one-dimensional for practice aims. The single factor contained 93% of the explained variance. This result was supported partially by testing the model constrained to a single latent factor.

The objective of a cross-sectional survey realized in 2006 from adults in the Beijing area was assessing the factorial structure and construct validity for the Chinese version of the M.D.A.S. (Yuan, Freeman, Lahti, Freeman, Lloyd-Williams, & Humphris, 2008). In the analysis confirmatory factor analysis and structural equation modelling were used; cross validation was tested with a North West of England comparison sample. The results showed that the Chinese version of M.D.A.S. consisted of two factors: anticipatory dental anxiety and treatment dental anxiety. The factors of the M.D.A.S. were confirmed and duplicated in the comparison sample.

Internal consistence

The Romanian version of M.D.A.S. presents a very good internal consistency, $\alpha=.90$ (Table 1). Similar results were reported in other studies.

In their first study, Coolidge, Chambers, Garcia, Heaton, and Coldwell (2008) determined psychometric properties of Spanish-language versions of M.D.A.S., D.F.S., and Needle Survey (N.S.). Cronbach alpha of Spanish M.D.A.S. was .80 to .85. In a more recent study, Coolidge and his colleagues report the performance of the Spanish M.D.A.S. in a new sample, as well as the performance of the Spanish Revised Dental Beliefs Survey (R-D.B.S.) Internal reliability for the M.D.A.S. was .88 and the test-retest reliability was .83. (Coolidge et al., 2010). For English representative sample of adults, Humphris, Dyer, and Robinson (2009) reported internal consistency coefficient of the M.D.A.S. as excellent (0.957, 95% CI 0.953, 0.961).

Correlations between MDAS and other scales

M.D.A.S. score is highest correlated with D.F.S. total score and then with the subscales physical arousal, fear and dental avoidance scores. This result supports construct validity. Also, the M.D.A.S. score significantly correlates with the McGill P.Q. score and with the T.A.Q. (especially with the cognitive subscale). Significant negative correlations are noticed between the M.D.A.S. score and the C.T.S. scores, except the performance subscale (not significant negative correlation). The highest negative correlation is recorded with the social self-esteem subscale (Table 3). The negative correlations between the M.D.A.S. and the C.T.S. and correlation between M.D.A.S. and T.A.Q. cognitive subscale, suggests and opening research on implications of cognitive factors as a mediators in relation between dental anxiety and non-cognitive variables.

Table 3. Intercorrelations matrix of M.D.A.S. with C.T.S., T.A.Q., McGill P.Q., and D.F.S.

Scale	CTS1	CTS2	CTS3	CTS4	TAQ1	TAQ2	TAQ3	TAQ4	McGill	DFS1	DFS2	DFS3	DFS4
MDAS	-.10	-.22**	-.16*	-.22**	.16*	.25**	.16*	.21**	.24**	.59**	.61**	.62**	.67**

Note: * $p<0.05$; ** $p<0.01$

Note: Current Thoughts Scale, C.T.S. (C.T.S. 1, performance subscale, C.T.S. 2, social subscale, C.T.S. 3 aspect subscale, C.T.S. 4 total score); Trimodal Anxiety Scale, T.A.Q. (T.A.Q. 1, somatic subscale, T.A.Q. 2, cognitive subscale T.A.Q. 3, behavioral subscale T.A.Q. 4 total score); Modified Anxiety Scale, M.D.A.S.; McGill Pain Questionnaire (McGill P.Q.); Dental Fear Survey D.F.S. (D.F.S. 1 dental avoidance subscale, D.F.S. 2, specific fear subscale, D.F.S. 3 physical arousal subscale, D.F.S. 4 total D.F.S.)

Conclusions

The D.A.S. and the M.D.A.S. are the most used scales for dental anxiety assessment. They are adapted and used in some European languages, are translated and available in China and in India. No Romanian version of the M.D.A.S. is available yet. The aims of our study were to translate and to verify the Romanian version of the M.D.A.S., to check its reliability and its validity in a sample from communities from the Western part of Romania. The M.D.A.S. used in our investigation has given reliable and valid results using the original and a translated version. We found evidence for the internal consistency, the construct validity, and the significant correlations between Romanian versions of the M.D.A.S. and D.F.S., McGill P.Q., T.A.Q., and C.T.S. scales.

Potential limitations of this study should be considered. Our sample was convenience one and this might limit the generalization of the results. Other limitation comes from the use of self-report measures that could be affected by attention or memory biases. It would be desirable to replicate the results using other samples from Romanian populations for provide representative norms for general population, for produce confirmatory evidence of Romanian M.D.A.S. psychometrics.

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