

The Arabic version of the modified dental anxiety scale

Psychometrics and normative data for 15-16 year olds

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ABSTRACT

الأهداف: تجهيز نسخة عربية للمقياس الحديث للخوف من علاج الأسنان، وفحص المعلومات المعيارية لهذه النسخة من أجل دعم مدى مصداقية هذا المقياس.

الطريقة: أُجريت الدراسة وعملية جمع المعلومات في المدارس التابعة لأربع مقاطعات تعليمية في العاصمة عمان، الأردن، واستمرت خلال الفترة من مارس 2009م إلى مارس 2010م. شارك في الدراسة 1602 من طلاب الصف العاشر (العمر 15-16 عاماً)، وقد أخذت العينة من 32 مدرسة. شمل الاستبيان بالإضافة إلى المقياس المترجم كلاً من: (i) السؤال العالمي عن الخوف من علاج الأسنان لفحص المصادقية الحالية للنسخة العربية، (ii) السؤال عن الشعور بعدم الحيلة في عيادة طب الأسنان وذلك لفحص المصادقية التركيبية للنسخة العربية، (iii) العوامل الديموغرافية.

النتائج: كان مستوى البيانات المفقودة للمقياس المترجم متدنياً، ووصل الاتساق الداخلي لهذه العينة باستخدام النسخة العربية للمقياس إلى 0.87 (95%CI:0.86-0.88). كان المقياس أحادي الأبعاد، وأبدت 22% من العينة درجة عالية من القلق والخوف حيال علاج الأسنان (≤ 19) وهي الحد الفاصل للمقياس). لقد تم العثور على الخلافات المتوقعة بين الجنسين، وكذلك بين انتظام الحضور لمواعيد فحص الأسنان. وكانت هناك علاقات واضحة ومتوقعة بين المقياس المترجم وبين كل من: (i) السؤال العالمي عن الخوف من علاج الأسنان، و(ii) السؤال عن الشعور بعدم الحيلة في عيادة طب الأسنان.

خاتمة: تبين من هذه الدراسة بأنه يمكن استخدام النسخة العربية من المقياس الحديث للخوف من علاج الأسنان وذلك من أجل تقييم نسبة الخوف من العلاج.

Objectives: To prepare an Arabic version of the Modified Dental Anxiety Scale (MDAS) and provide normative information including evidence to support the validity of the measure.

Methods: The MDAS was translated into Arabic and back-translated into English. Data collection took place

in Amman, Jordan from March 2009 to March 2010. One thousand and six hundred two 10th grade students took part in the study (15-16 years of age) sampled from 32 schools. Questionnaire consisted not only of the MDAS, but also (i) a single global question on dental anxiety to test concurrent validity, (ii) a question on helplessness in the dental surgery to test construct validity and (iii) demographic profile.

Results: The level of missing data was minimal for the translated scale. The internal consistency for this sample using the Arabic MDAS was 0.87 (95% confidence interval was 0.86-0.88). The measure was a one-dimensional scale. The proportion of the sample that was highly dentally anxious was 22% (≥ 19 cut-off score). Expected differences between gender and self-reported dental attendance were observed. There were clear significant relationships as predicted between the Arabic MDAS and (i) a single item measure of dental anxiety and (ii) feeling helpless in the dental chair on a previous occasion.

Conclusion: The Arabic version of the MDAS can be employed for brief assessment of dental anxiety.

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Dental anxiety is an important predictor of dental attendance with high levels acting as a barrier to regular attendance. The assessment of dental anxiety is an important procedure for clinical and research purposes. There are a number of scales available to assess dental anxiety.¹ The modified dental anxiety scale (MDAS)² was developed to be an improvement of Corah's³ dental anxiety scale. The MDAS has an extra question to the 4 item list, and invites respondents to rate their anxiety to a local anaesthesia.² The measure is simple, quick and easy to complete, reliable, with evidence for validity, and no instrumental effects (it does not cause increases in anxiety upon completion).⁴ Norms exist from the UK⁵ and the questionnaire wording was translated into a number of languages, namely, Spanish, Greek, Turkish, and Chinese,⁶⁻¹⁰ which have received detailed validation. Arabic, an important world language has been estimated to consist of 258 million first language speakers. It is the sixth most frequently reported language used.¹¹ This study was carried out to prepare an Arabic version of the MDAS and provide normative information including evidence to support the validity of the measure.

Methods. Approval was obtained from The Deanship of Academic Research at the University of Jordan as well as the Ministry of Education at Amman, Jordan. Collection of data took place from March 2009 to March 2010. The study was carried out according to principles of the Helsinki Declaration.

A list of all schools from the 4 educational districts in the capital of Amman was obtained. The list was stratified according to gender since 10th grade students are schooled in single gender schools. A cluster random sample of 32 schools was chosen from random number generators. The schools were divided into 16 all girls schools, 4 from each district and 16 all boys schools, 4 from each district. There was an initial visit to each school when a list of 10th grade students was obtained from the headmaster of the selected school and an appointment made for a second visit to conduct the study.

Parental consent was obtained prior to participation in the study. A letter detailing the purpose of the study was sent to the parents of the 10th grade students in selected schools. Negative consent method was used. If the parents did not want their child to participate, they could send a negative reply to the school.

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From each school, 50 tenth grade students were invited to take part in the study. The 50 students from each school were selected using random number generators from a class list of all 10th grade students in that school. Students whose parents sent a negative reply to school were not included in the study and the student whose name appeared next from the random selection list was included. Students completed the questionnaire inside the classroom following a brief explanation by one of the authors.

A total of 1602 tenth grade students participated in the study. Inclusion criteria was participants whose age was within the age range of 15-16 years. Those outside the selected age range were eliminated (n=122). One thousand and four hundred eighty out of 1602 questionnaires were included in the study. Sixty-five respondents were found to have missing data of which 31 had failed to complete one or more of the MDAS questions. All respondents with one or more missing data point(s) on a variable were excluded. Thus, only 1415 participants completed the questionnaires (690 males and 725 females).

The questionnaire. The MDAS had been translated into Arabic by the first author, who is fluent in both the Arabic and English languages. The MDAS was then back translated by another bilingual speaker in the University of Jordan to ensure accuracy of the translation. The MDAS consists of 5 items inquiring about the level of anxiety of the respondents in reaction to 5 situations: (i) a dental visit planned for the following day, (ii) being in the waiting area of a dental clinic, (iii) having a tooth drilled, (iv) having scaling of the teeth and (v) having a local anesthetic injection. A Likert scoring method is used with 5 possible answers to each question. The possible answers are: Score 1: not anxious, Score 2: slightly anxious, Score 3: fairly anxious, Score 4: very anxious, and Score 5: extremely anxious.² The MDAS has been shown to have good reliability and validity.^{2,12} A cut-off for high dental anxiety has been established.¹³

The Arabic version of the MDAS was tested on a pilot group of tenth grade students (n=70) prior to commencement of data collection. The translation was found to be intelligible by the pilot group of students through the process of questionnaire completion, item-by-item and encouragement of discussion of the scale with participants with the first author. A single question on dental anxiety was included to test concurrent validity. This question was found to be useful in screening for dental anxiety.¹⁴ The question asked the respondents whether a visit to the dentist was: 'not scary at all', 'scary to some extent' or 'very scary'. A score of 1 was given to the first answer, a score of 2 given to the second answer, and a score of 3 given to the third answer. To test the construct validity, the respondents were also

asked to rate the degree of helplessness they felt when visiting the dentist in the past. The sentence used was 'You felt extremely helpless during dental treatment'. The possible answers were "strongly agree", "agree", "neither agree or disagree" "disagree," and "strongly disagree". The score ranged from 1-5.^{15,16} Demographic data as well as the dental attendance pattern of the participants was collected.

Statistical analysis. Data analysis was carried out using the Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA), Version 18. The reliability was tested using FACTOR, a computer program to fit the exploratory factor analysis model.¹⁷ We used this principal factor method and Horn's parallel analysis to view the factorial structure.¹⁸ We used AMOS (Analysis of MOment Structures) Version 17 (SPSS Inc., Chicago, IL, USA) for confirmatory analyses.¹⁹ Descriptive measures included mean and standard deviation, and test of significance was carried out using a correlation test. Data were expressed as mean ± standard deviations for calculating the major demographics factors and self-reported visiting. A cut-off of ≥19 was applied to indicate high dental anxiety. The proportion of individuals who scored ≥19 was calculated and compared with the demographic and behavioral variables.

Results. One area of discussion emerged during the translation of the fourth item in the MDAS scale. The item inquired about the anxiety level related to having the teeth scaled and polished. In the colloquial Jordanian Arabic, the word used for 'scaling' of teeth when translated into English would more accurately mean 'cleaning' of teeth. This is the word that is mostly used by people in Jordan to mean scaling of teeth. We opted, however, not to use this word from spoken Jordanian Arabic, but to use the proper translation of the word 'scaling' into Arabic. Spoken Arabic differs from one country to the other, but written classical Arabic is common to all Arabic speaking people. Some of the participants did inquire about the Arabic word used to mean scaling. Their inquiries were answered by one of the authors present during completion of the questionnaire. Most of the inquiries were from participants who wanted assurance that the word actually meant 'scaling'. The fact that this word was followed by the translation for 'polishing' of teeth indeed guided participants into verifying that the word did refer to scaling of teeth.

The percentage of respondents who failed to answer one or more of the 5 MDAS questions was 1.9%. The number of respondents who scored 19 and above on the MDAS scale was 320 (22.6%) out of a total of 1415 respondents. Figure 1 shows a histogram of the distribution of the MDAS scores. The internal

consistency of the scale was good as indicated by the Cronbach alpha coefficient of 0.88 (95% CI: 0.87 to 0.89).²⁰ The scale was deemed to be unidimensional as shown by a confirmatory factor analysis that showed by an excellent fit of the raw data to a single latent factor with only 3 correlated error terms included (Chi-square = 1.0 , df = 2, $p=0.55$, Comparative Fit Index = 1, Tucker-Lewis Index = 1, Root Mean Square Error of Approximation = 0.001). Male respondents were less anxious than females ($t = 14.34, p<0.0001$). Over a third of females (34%) scored at or above the cut-off level. The 15-year-old respondents were less anxious than their 16-year-old counterparts ($t = 3.84, p<0.0001$). The details of these comparisons are presented in Table 1. Dental anxiety varied considerably across levels of self-

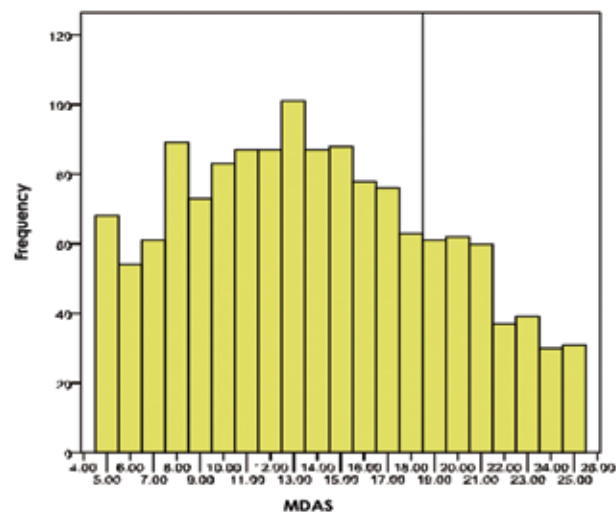


Figure 1 - Histogram of modified dental anxiety scale (MDAS) data (N=1415). Mean±SD: 13.91±5.358

Table 1 - The modified dental anxiety scale across gender, age and self-reported dental attendance.

Variables	N (%)	Mean±SD	Cut-off value
Total	1415 (100)	13.91 ± 5.358	22.6
Gender			
Male	690 (48.8)	11.95 ± 4.79	10.0
Female	725 (51.2)	15.77 ± 5.2	34.6
Age (years)			
15	1081 (76.4)	13.61 ± 5.15	20.6
16	334 (23.6)	14.88 ± 5.39	29.0
Visiting the dentist			
Last 6 months	538 (38.0)	13.53 ± 5.62	21.2
A year ago	293 (20.7)	13.78 ± 5.13	21.8
More than a year ago	360 (25.4)	14.37 ± 5.25	25.3
Never been	224 (15.8)	14.25 ± 5.12	22.8

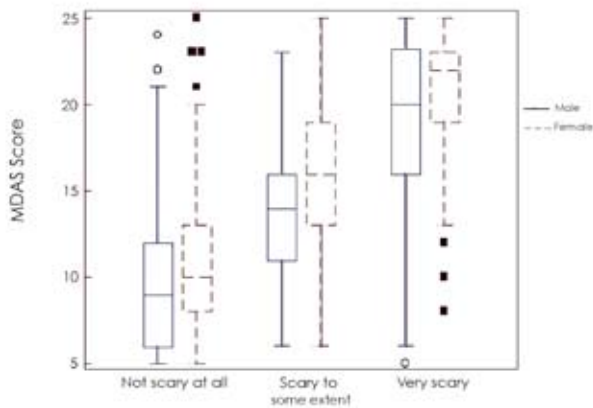


Figure 2 - Boxplot of modified dental anxiety scale (MDAS) scores by self-reported single item of dental anxiety and gender.

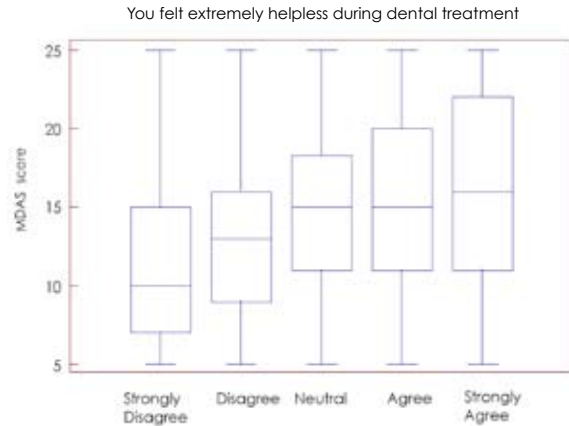


Figure 3 - Boxplot of modified dental anxiety scale (MDAS) scores by the level of helplessness experienced in the dental chair in the past.

reported dental visiting behavior ($F = 4.32$; $df = 3$, 1407 ; $p=0.005$). The most anxious was the group who rated themselves as 'not visiting the dentist more than a year ago' (25% at or above cut off). The relationship of the total MDAS score with the single item of dental anxiety was found to be strong ($F = 478.2$; $df = 2$, 1409 ; $p<0.0001$). This relationship was shown clearly in the box plots in both male and females (Figure 2). Likewise the level of helplessness experienced in the dental chair in the past by respondents (Figure 3) relates closely to current reports of dental anxiety assessed by the MDAS ($F = 31.45$; $df = 4$, 1410 ; $p<0.0001$).

Discussion. This is the first reported investigation of the Arabic version of the modified dental anxiety scale. The translation was deemed successful as only a single issue with the word 'scaling' was evident in the preparation phase of the Arabic version. The inclusion of the word 'polish' juxtaposed in the prophylaxis item confirmed to respondents that the meaning of the word was scaling. No other issue was identified in the translation to cause comment. The questionnaire received a high completion rate (98.9%) strengthening the view that it is easy to complete with minimal supervision. The favorable psychometric indices on reliability and unidimensional factor structure are closely comparable to the English version of the MDAS recently reported in a UK sample.⁵ Validation issues were explored by relating the data of this Arabic MDAS version to a validated single dental anxiety question employed in Finland¹⁴ and against other variables including previous experiences of feeling helpless,^{15,16} and previous self-reported dental attendance. All planned associations were strongly endorsed further supporting the validity of the measure. Levels of dental anxiety are exceptionally difficult to compare across

different measures. Moreover the cut-off scores used by different measures are frequently not clinically or scientifically derived. The advantage of the MDAS is that there is evidence of a suitable cut-off that has been reported based upon both clinical and scientific grounds.¹³ Twenty-three percent of this young sample had anxiety levels above the cut-off point of 19. The closest comparison sample to the knowledge of the authors is the university student study reported by Humphris and King¹⁶ who showed that the proportion of highly anxious respondents was 11.2%. If this cut-off is applied to the current sample we find that the level of 'high dental anxiety' is approximately double that quoted in UK.¹⁶ The reasons behind such a high level of dental anxiety being present in this young population need further investigation. It can be speculated however that being teenagers, these young individuals are at a difficult period in their lives where they are highly anxious about a number of issues which can be reflected as an increased level of dental anxiety.

The level of 23% of respondents with such a level of dental anxiety if reflected across Saudi Arabia or other Arabic speaking countries would indicate to dental providers that they need to consider how to assist this young adult age group receive any dental treatment required as typically the dental anxiety experience at or above the cut-off may require additional assistance by behavioral management or possibly pharmacological treatment. Reports of dental anxiety levels from other surveys in the Arabic speaking world are difficult to compare and interpret accurately because investigators have used Arabic versions of other scales, namely Dental Fear Survey and Corah's DAS that have not been psychometrically tested.^{21,22}

A limitation of the study was the focus on young people only. Additional data from older age groups

would be important to improve generalization. Researchers and clinicians wanting to compare results of their MDAS responses from participants or patients aged greater than 16 years of age should proceed with caution as typically dental anxiety reports are more intense in younger people. However, the scale has shown good reliability and evidence for validity including unidimensionality, and confirmation to predicted relationships. The ability of researchers to compare their results using this measure between services, regions and patient groups, cross-sectionally and longitudinally is important to assist service development and planning.

In conclusion, the Arabic version of the MDAS can be successfully used to assess dental anxiety in Arabic speaking populations. Areas of future research would include assessing dental anxiety using this tool over an older age group.

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