Validity and reliability of an Arabic version of the state-trait anxiety inventory in a Saudi dental setting

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ABSTRACT

The objectives of this study were to test the psychometric properties of an adapted Arabic version of the state trait anxiety-form Y (STAI-Y) in adult dental patients.

Methods: In this cross-sectional study, the published Arabic version of the STAI-Y was evaluated by 2 experienced bilingual professionals for its compatibility with Saudi culture and revised prior to testing. Three hundred and eighty-seven patients attending dental clinics for treatment at the Faculty of Dentistry Hospital, King Abdullah University, Jeddah, Kingdom of Saudi Arabia, participated in the study. The Arabic version of the modified dental anxiety scale (MDAS) and visual analogue scale (VAS) ratings of anxiety were used to assess the concurrent criterion validity.

Results: The Arabic version of the STAI-Y had high internal consistency reliability (Cronbach's alpha: 0.989) for state and trait subscales. Factor analysis indicated unidimensionality of the scale. Correlations between STAI-Y scores and both MDAS and VAS scores indicated strong concurrent criterion validity. Discriminant validity was supported by the findings that higher anxiety levels were present among females as opposed to males, younger individuals as compared to older individuals, and patients who do not visit the dentist unless they have a need as opposed to more frequent visitors to the dental office.

Conclusion: The Arabic version of the STAI-Y has an adequate internal consistency reliability, generally similar to that reported in the international literature, suggesting it is appropriate for assessing dental anxiety in Arabic speaking populations.

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Axiety associated with dental treatment is documented to cause 6% of the general population to skip dental appointments. Therefore, it is of extreme importance to thoroughly assess dental anxiety in the
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dental office and to implement measures to control it, so as to provide effective dental treatments; thus, improving dental care and oral health in patients. Several psychometric scales have been developed to measure the presence and severity of current symptoms of anxiety. Such scales are available in different versions for adults and children, and are widely used in both research and clinical practice. The state-trait anxiety inventory (STAI) is one of the most extensively used scales to measure anxiety worldwide. This self-reported scale was first published by Spielberger et al7 in 1970, as the STAI-form X (STAI-X). Subsequently, the STAI scale was revised in 1983 to the STAI-form Y (STAI-Y).8 The STAI has a total of 40 questions allocated to 2 subscales: the State Anxiety Scale (S-Anxiety), and the Trait Anxiety Scale (T-Anxiety). It possesses excellent psychometric properties for assessing state, and trait anxiety in clinical and research settings.9,6 Since its first introduction, the STAI has been used in more than 8,000 research studies in different disciplines including; but not limited to medicine, psychology, education, and social sciences,8 and has been translated into more than 60 languages and dialects, including Spanish,9 Portuguese,10 Chinese,11 French,12 Japanese,13 and Arabic.14 Several studies have used the Arabic version of the STAI.15-17 However, psychometric information regarding the Arabic version of the STAI is limited to studies of specific populations of school and university students from Egypt, Jordan, and Lebanon.14-16 In addition, the scales were directly translated without attention to cross cultural issues such as whether emotional states or personality traits are comparable among different cultures; situations that induce anxiety may differ in this respect. Accordingly, the scales may need adjustment to be culturally appropriate. The Arabic language varies considerably between different Arab cultures, particularly with respect to slang and colloquial usage. As such, the Saudi population has distinct cultural and linguistic characteristics as compared with other Arab countries. Consequently, it is inadvisable to use the directly translated scale without further validation or adaptation. Additionally, testing a Saudi specific version of the scale would provide further data regarding the reliability and validity of the STAI-Y. In this study, the commercially available STAI-Y scale was purchased with no warranty or assurance from the company regarding the quality of translation, and no validation data are available. In view of this, our aim was to investigate the psychometric properties of an adapted Arabic version of the STAI-Y9,18 in Saudi adult dental patients.

Methods. Research design and study sample. This cross sectional study distributed the prepared Arabic version of the STAI-Y to a convenience sample of adult patients who were attending the dental clinics at the Faculty of Dentistry, King Abdulaziz University Hospital, Jeddah, Saudi Arabia, for treatment. Patients attending were mostly Saudis, with varying socioeconomic status. Ethical approval and a waiver of informed consent were obtained from the Ethical Committee of the University, Jeddah, Saudi Arabia. The study was conducted between May 2015 and October 2015, following the principles of the Declaration of Helsinki. All patients were also provided with a brief explanation of the study by the author before participating in the study. The patients were asked to complete the questionnaire in the waiting area prior to their dental appointment. Demographic data including age, gender, and frequency of dental visits were also reported by the participating patients. Sample size was calculated a priori for factor analysis using a ratio of 20:1 (participants to items). Assuming 20 items would be included in the model, the minimum required sample size was 400 patients.19 Both males and females between the ages of 18 and 70 years were allowed to participate in the study. Our target sample size was 400 patients. Of the 400 patients, 4 refused to participate. Eight questionnaires were incomplete and were excluded from the study. A total of 387 questionnaires were included in analyses.

Questionnaire. The STAI-Y9 consists of 40 items, split into 2 multiple choice subscales of 20 items each. The first questionnaire measure states anxiety (S-anxiety), consisting of questions that address how respondents feel at the moment, including items that measure subjective feelings of calm, tension, apprehension, nervousness, worry, and other questions that assess autonomic nervous system activity. State anxiety scale items are rated on a 4 point Likert scale (1 = not at all, 2 = somewhat, 3 = moderately so, and 4 = very much so). The second subscale measures trait anxiety (T-anxiety), on how respondents generally feel, using items that measure general states of calmness, security, and confidence. Items were rated on a 4 point Likert scale (1 = almost never, 2 = sometimes, 3 = often,
and 4 = almost always. The total STAI-Y score for each subscale (S-anxiety and T-anxiety) is the addition of response scores for the 20 items, and ranges from 20-80, with higher scores indicating greater anxiety. We followed the test adaptation procedure recommended by Spielberger and Sharma. The commercially available Arabic translation of the STAI-Y (Mind Garden, Menlo Park, CA, USA) was evaluated and revised to assess the quality of Arabic translation and to culturally adapt the scale to Saudi dialect, so as to provide a final set of items that were compatible with Saudi culture. This revision was completed by 2 bilingual experts in dentistry, for whom Arabic was their native language. Both were fluent in English. Those items for which there was an agreement between the translators were subsequently piloted in an Arabic speaking Saudi population, to assess the difficulty of answering the questionnaire. The pilot group consisted of a convenience sample of 50 patients attending the dental clinics. The patients were interviewed while they were completing the questionnaire, to evaluate the clarity of the content. Final adjustments were made to the questionnaire before formally testing its psychometric properties. To assess concurrent criterion validity, we used the Arabic version of the Modified Dental Anxiety Scale (MDAS) and anxiety ratings made using a visual analogue scale (VAS), where 100 referred to extreme anxiety and zero denoted not at all anxious. For the MDAS, the patients were asked to report their anxiety level in response to 5 scenarios. Responses were chosen from 5 possible levels of anxiety, from 1 (not anxious) to 5 (extremely anxious).

Statistical analysis. The Shapiro-Wilk test was used to assess the normality of STAI scores. As the distribution of STAI scores was not normal, latent variable analysis with a robust maximum likelihood (MLM) method was used in FACTOR software version 9.2. The root mean square residual (RMSR) was used as the indicator of model fit. The cutoff value for an acceptable model fit was RMSR ≤0.05 (Factor 9.2 software, Rovira i Virgili University, Tarragona, Spain). We examined the factorability of the dataset using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett’s test of sphericity. Known-group validity was tested by comparing STAI scores among groups using the Mann-Whitney test (in case of 2 groups) or Kruskal-Wallis test (for 3 or more groups). In the case of a significant Kruskal-Wallis test, multiple comparisons among groups were performed using Dunn-Bonferroni tests. Criterion validity was tested based on correlations with the MDAS and anxiety VAS scores. Convergent and discriminant validity were examined via Spearman’s rho correlations within and between items and totals for cases where state trait anxiety was absent and cases where it was present. Concurrent criterion validity was tested using the correlations with the MDAS and VAS. Reliability was calculated as ordinal alpha reliability. Data were analyzed using IBM SPSS 20 (IBM, Armonk, NY, USA). A p-value<0.05 was taken as statistically significant. All tests were 2 tailed.

Results. The final sample consisted of 173 men (44.7%) and 214 women (55.3%), with an overall mean age of 39.55 ± 9.11 years.

Characteristics of the STAI-Y. The median anxiety state score was 53, and significantly higher among females (n=60) than males (n=39). The median trait anxiety score was 60, and was significantly higher among females than males (females n=60, males n=41) (Table 1). Items indicating the presence and absence of state and trait anxiety showed consistently the same pattern, namely significantly higher values among females versus males. Internal consistency reliability analysis generated a Cronbach’s alpha value of 0.989 for the total state subscale, with an alpha of 0.976 for anxiety absent items and 0.981 for anxiety present items.

| Variables | Male (n=173) | Female (n=214) | Total (n=387) |
|-----------|-------------|---------------|--------------|
|           | Md. | 25<sup>th</sup> | 75<sup>th</sup> | Alpha | Md. | 25<sup>th</sup> | 75<sup>th</sup> | Alpha | Md. | 25<sup>th</sup> | 75<sup>th</sup> | Alpha |
| **State A** | | | | | | | | | | | | |
| Total | 39 | 24 | 41 | 0.978 | 60 | 53 | 72 | 0.971 | 53 | 39 | 60 | 0.989 |
| Absent | 20 | 13 | 21 | 0.953 | 30 | 26 | 36 | 0.943 | 26 | 20 | 30 | 0.976 |
| Present | 19 | 12 | 20 | 0.961 | 30 | 27 | 36 | 0.938 | 27 | 19 | 30 | 0.981 |
| **Trait A** | | | | | | | | | | | | |
| Total | 41 | 24 | 49 | 0.968 | 60 | 60 | 74 | 0.985 | 60 | 41 | 60 | 0.989 |
| Absent | 15 | 8 | 19 | 0.953 | 21 | 21 | 24 | 0.928 | 21 | 15 | 21 | 0.964 |
| Present | 26 | 16 | 30 | 0.933 | 39 | 39 | 50 | 0.985 | 39 | 26 | 39 | 0.986 |

<sup>P≤0.001 for all comparisons between males and females in the STAI scores distribution (Mann-Whitney test) STAI- State-Trait Anxiety Inventory</sup>
For the trait anxiety subscale, the total Cronbach’s alpha value was for trait absent items 0.989, 0.964, and for trait present items 0.986. Both subscales and the total scale were acceptably reliable for males and females.

**Validity analysis.** Face validity was assessed by 2 experts who reviewed the relevance and suitability of the scale items for dental anxiety. Content validity was tested using exploratory factor analysis (EFA). As STAI subscales were expected to be correlated, an oblique (promax) rotation was used. The number of factors retained was evaluated using Kaiser’s criterion (namely an eigen value >1) and model fit indices. Two factors (Table 2) possessed eigen values greater than one for state (16.5 and 1.2) and trait (16.3 and 1.7). An acceptable model fit was found for the one factor solution (RMSP = 0.044 for state, and RMSR = 0.040 for trait). Table 2 shows the rotated factor loadings for this 2 factor solution. Factor 1 explains most of the variance in the state and trait subscales (82.2%). Regardless of subscale, Factor 1 showed higher loading by most of the state items (16 out of 20). This was also true for Factor 1 in the trait model (11 items out of 20). Concurrent criterion validity (Table 3) was strongly positive, as indicated by statistically significant correlations with MDAS of 0.906 for state scores, and 0.848 for trait. Correlations with anxiety VAS scores were also acceptable at 0.768 (state) and 0.696 (trait). Construct convergent and discriminant validity (Table 3) were indicated by strong, positive correlations within state and trait subscales, for both presence and absence items (all >0.90; data not shown). Correlations between total state or trait anxiety absent state or trait anxiety present scores were all strongly negative, and significant (all <0.90; Table 3).

Table 4 confirms the known group comparison validity of both subscales, whereby significant differences in scale scores were observed according to age and frequency of dental visits. Older patients had significantly lower state and trait anxiety levels: the median state and trait anxiety in the >50 age group was 24 for both subscales, as compared to the 20-29 age group, whose medians were 53 state and 60 trait. All pairwise comparisons between age groups were significant, except between the 20-29 and 40-49 groups for the state subscale, and between 20-29 and 30-39 groups for the trait subscale. Significant differences in state anxiety were observed between those who visit the dentist occasionally, or users who only visit the dentist when in need of care. A significant difference in trait scores was also observed between those who visit the dentist occasionally (n=49) and regular users, (n=40) or users who only visit when in need of care (n=60).

**Discussion.** The main goal of the present study was to investigate an Arabic version of the STAI-Y. This study was conducted on adult dental patients, in contrast to other studies that used the Arabic version, which were primarily conducted on students. The average scores for patients participating in the study were substantially higher than those reported in the English STAI Manual. The average state score in the current study was 53 versus 36.54 in the English STAI manual, whereas trait values were 60 and 35.55 in the English STAI manual. The high values in our study might be attributed to the high anxiety expected in our target population (dental patients) as opposed to the general population. The results of the current study suggest that this modified Arabic version of the

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**Table 2 - Exploratory factor analysis of STAI.**

| Exploratory factor analysis | State anxiety | Trait anxiety |
|-----------------------------|---------------|--------------|
|                             | Factor 1      | Factor 2     | Factor 1 | Factor 2 |
| Eigenvalue                  | 16.5          | 1.2          | 16.3     | 1.7      |
| Percentage of variance      | 82.2          | 6.1          | 81.5     | 8.3      |
| Bartlett’s test (P-value)   | 19276.1       | <0.001       | 19504.5  | <0.001   |
| KMO                         | 0.953         | 0.968        |
| RMSR                        | 0.044         | 0.040        |
| Factor loadings             |               |             |
| Q1                          | 0.971         | 0.741        | 0.865    | 0.912    |
| Q2                          | 0.957         | 0.894        | 0.976    | 0.807    |
| Q3                          | 0.946         | 0.893        | 0.963    | 0.776    |
| Q4                          | 0.939         | 0.682        | 0.837    | 0.712    |
| Q5                          | 0.460         | 0.794        | 0.737    | 0.834    |
| Q6                          | 0.940         | 0.887        | 0.982    | 0.817    |
| Q7                          | 0.852         | 0.755        | 0.681    | 0.950    |
| Q8                          | 0.864         | 0.810        | 0.917    | 0.538    |
| Q9                          | 0.936         | 0.703        | 0.707    | 0.972    |
| Q10                         | 0.860         | 0.752        | 0.648    | 0.927    |
| Q11                         | 0.911         | 0.529        | 0.940    | 0.681    |
| Q12                         | 0.780         | 0.965        | 0.889    | 0.947    |
| Q13                         | 0.823         | 0.712        | 0.640    | 0.817    |
| Q14                         | 0.931         | 0.890        | 0.979    | 0.809    |
| Q15                         | 0.795         | 0.975        | 0.801    | 0.925    |
| Q16                         | 0.895         | 0.859        | 0.701    | 0.966    |
| Q17                         | 0.808         | 0.989        | 0.974    | 0.786    |
| Q18                         | 0.930         | 0.843        | 0.970    | 0.780    |
| Q19                         | 0.960         | 0.900        | 0.953    | 0.746    |
| Q20                         | 0.950         | 0.779        | 0.978    | 0.791    |

KMO - Kaiser-Meyer-Olkin, RMSR - root mean square residual

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STAI-Y is both reliable and valid, with psychometric properties close to those reported in the international literature. This modified scale had high internal consistency reliability, with a Cronbach’s alpha value of 0.989 for the total state subscale, and 0.989 for the total trait subscale. This high reliability is in accordance with other translated versions of the STAI-Y: Cronbach’s alpha for the Greek version was 0.93 for state and 0.92 for trait subscales, and for a group of Lebanese and American university students, Cronbach’s alpha ranged from 0.93 to 0.95 for state and 0.91 to 0.93 for trait anxiety. In addition, we found that Cronbach’s alpha coefficients were high for both males and females (state: males = 0.978, females = 0.971; trait: males = 0.968, females = 0.985). These results are comparable to Abdulatif,6 which confirms that this scale is equally reliable for both males and females.

Factor analysis indicated that a one factor model provided the best fit to our data for both state and trait subscales. Other studies have suggested different

Table 3 - Correlation matrix of STAI scale with MDAS and VAS

| Scale         | Trait | State Total | State Absent | State Present | Trait Absent | Trait Present | VAS |
|---------------|-------|-------------|--------------|---------------|--------------|---------------|-----|
| State total   | r     | 0.925       |              |               |              |               |     |
|               | P-value | 0.000       |              |               |              |               |     |
| State absent  | r     | 0.930       | 0.992        |               |              |               |     |
|               | P-value | 0.000       | 0.000        |               |              |               |     |
| State present | r     | 0.927       | 0.993        | -0.980        |              |               |     |
|               | P-value | 0.000       | 0.000        | 0.000         |              |               |     |
| Trait absent  | r     | 0.998       | 0.924        | 0.928         | -0.929       |               |     |
|               | P-value | 0.000       | 0.000        | 0.000         | 0.000        |               |     |
| Trait present | r     | 0.998       | 0.929        | -0.932        | 0.928        | -0.993        |     |
|               | P-value | 0.000       | 0.000        | 0.000         | 0.000        | 0.000         |     |
| VAS           | r     | 0.768       | 0.696        | 0.700         | 0.697        | 0.766         | 0.769|
|               | P-value | 0.000       | 0.000        | 0.000         | 0.000        | 0.000         | 0.000|
| MDAS          | r     | 0.906       | 0.848        | 0.853         | 0.847        | 0.905         | 0.903|
|               | P-value | 0.000       | 0.000        | 0.000         | 0.000        | 0.000         | 0.000|

VAS - visual analogue scale, MDAS - modified dental anxiety scale, STAI - State-Trait Anxiety Inventory

Table 4 - The state-trait anxiety inventory by age and frequency of dental visits.

| Demographic characteristics | Median State (25<sup>a</sup>, 75<sup>a</sup>) | P-value | Median Trait (25<sup>b</sup>, 75<sup>b</sup>) | P-value |
|-----------------------------|---------------------------------------------|---------|---------------------------------------------|---------|
| Age groups                  |                                             |         |                                             |         |
| 20-29                       | 53<sup>*</sup>                              | <0.001  | 60<sup>*</sup>                              | <0.001  |
| 30-39                       | 53                                          |         | 60                                          |         |
| 40-49                       | 60<sup>*</sup>                              |         | 60<sup>*</sup>                              |         |
| ≥50                         | 24                                          |         | 24                                          |         |
| Frequency of dental visits  |                                             | <0.001  |                                             | <0.001  |
| Regular                     | 44<sup>*</sup>, 23                          |         | 40<sup>*</sup>                              |         |
| Occasional                  | 41                                          |         | 49                                          |         |
| On need                     | 53<sup>†</sup>                              |         | 60                                          |         |

Distributions with common superscript within variable are not significantly different
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models. Abdullatif\textsuperscript{26} compared separate 2 and 3 factor solutions for S-anxiety and T-anxiety for American and Lebanese samples. He found both solutions were strikingly similar, concluding that the 2 factor model is simple and provides a good fit to the data. In a Korean study\textsuperscript{26} that only considered the trait component a unifactorial model was compared with a bifactorial model. Exploratory factor analysis supported the 2 factor solution, while confirmatory factor analysis supported both single factor and 2 factor models. The authors concluded that the one factor model is more interpretable and they suggested removal of the reversed items.\textsuperscript{26} We supported the one factor model for several reasons. First, we did not test separately the state and trait components as we preferred to simplify the model and adhere to the conceptual definition of state and trait anxiety as 2 psychological constructs of the anxiety scale. Second, this one factor solution explained most of the variance (>80%) for both state and trait items. Third, both reversed and unreversed items correlated equally well with MDAS and anxiety VAS scores, which implies that there is no need to separate items into 2 subscales. However, a different factor structure might arise if we conducted another study involving a larger and more diverse sample of the Saudi population. The correlation of our scale with both MDAS and anxiety VAS scores indicated strong concurrent criterion validity (Table 3). This is consistent with 2 previous studies that addressed trait anxiety components, although they used different validity criteria.\textsuperscript{26,29} Our results also indicated strong convergent and discriminant validity, again in accordance with previous studies.\textsuperscript{26,30} To confirm the discriminant validity of the STAI-Y scale, we compared the patients by gender, age, and frequency of dental visits. All comparisons were consistent with several studies that indicated higher anxiety levels among females as opposed to males,\textsuperscript{21,28,31-34} younger versus older individuals,\textsuperscript{21,26,31,35-37} and patients who do not visit the dentist unless they have a specific need as opposed to more frequent visitors to the dental office.\textsuperscript{21,35,38}

**Study limitations.** We used a convenience sample of dental patients, and we should be cautious on generalizing these findings to other populations. In this study, random sample was difficult to obtain due to the shortage of complete database of all patients attending the clinics. Additional research involving other ages and clinical groups is needed to further test the generality of these results. Moreover, external validity could be better assessed by applying the same questions to adult dental patients in other centers in Saudi Arabia. Second, the data reported in this study were collected via self report, and thus relationships between variables may have been inflated by questionnaire specific method variance. Additionally, both predictive validity and test retest reliability, which measure scale stability, were not assessed. As this was a cross sectional study, it would have been difficult to follow up the same subjects. Additional studies could improve upon this by undertaking such a follow up, combined with assessing future outcomes. Further, diagnostic validity was not assessed as there were no confirmed diagnoses of anxiety disorder for the participants in the present study. Finally, the questionnaire requires approximately 10 minutes to complete, which is a substantial time burden; future research should attempt to develop a shorter version. Despite these limitations, this study usefully adapted a Western anxiety scale into the Arabic language, which is spoken in more than 20 countries by 300 million people.\textsuperscript{39} It is of great importance to develop a standardized Arabic version of the STAI-Y scale, using simple Arabic language that is appropriate and understandable by all Arabic speaking individuals across different Arabic cultures and countries. Future studies should validate this version of the Arabic STAI-Y in different settings and in other Arabic speaking countries. Adapting the STAI-Y for other Arabic cultures would also be beneficial for cross cultural research.

In conclusion, our proposed Arabic version of the STAI-Y has an adequate internal consistency, as well as convergent and criterion validity, being generally comparable to those reported in the international literature.

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**References**

1. Bernstein DA, Kleinknecht RA. Multiple approaches to the reduction of dental fear. *J Behav Ther Exp Psychiatry* 1982; 13: 287-292.
2. Elter JR, Strauss RP, Beck JD. Assessing dental anxiety, dental care use and oral status in older adults. *J Am Dent Assoc* 1997; 128: 591-597.
3. Julian LJ. Measures of anxiety: State-Trait Anxiety Inventory (STAI), Beck Anxiety Inventory (BAI), and Hospital Anxiety and Depression Scale-Anxiety (HADS-A). *Arthritis Care Res (Hoboken)* 2011; 63: 5467-5472.
4. Spielberger CD. Assessment of state and trait anxiety: Conceptual and methodological issues. *Southern Psychologist* 1985; 2: 6-16.
5. Spielberger CD. State-Trait Anxiety Inventory: a comprehensive bibliography, Spielberger CD. 2nd ed. Palo Alto (CA): Consulting Psychologists Press; 1989.
6. Spielberger CD, Gorsuch RC, Lushene RE, Vagg PR, Jacobs GA. Manual for the State-Trait Anxiety Inventory. Palo Alto (CA): Consulting Psychologists Press; 1983.
Validity and reliability of Arabic STAI-Y ... Bahammam

7. Spielberger CD, Gorsuch RL, Lushene RE. Manual for the State-Trait Anxiety Inventory. Palo Alto (CA): Consulting Psychologists Press; 1970.
8. Sesti A. State trait anxiety inventory in medication clinical trials. Quality of Life Newsletter 2000; 25: 15-6.
9. Spielberger CD, Gonzalez-Regiosia F, Martinez-Urrutia A, L Natalicio, D Natalicio. Development of the Spanish edition of the State-Trait Anxiety Inventory. Intern J Psychol 1971; 5: 3-4.
10. Biaggio A, Natalicio L, Spielberger CD. The development and validation of an experimental Portuguese form of the State-Trait Anxiety Inventory. In: Spielberger CD, Diaz-Guerrero R. Cross-cultural measurement of anxiety. Washington (DC): Hemisphere; 1976. p. 29-40.
11. Shek DT. What does the Chinese version of the Beck Depression Inventory measure in Chinese students—general psychopathology or depression? Journal of Clinical Psychology 1991; 47: 381-390.
12. Bouchard SP, Ivers H, Gauthier JG, Pelletier MH, Savard J. Psychometric properties of the French version of the State-Trait Anxiety Inventory (form Y) adapted for older adult. Can J Aging 1998; 17: 440-453.
13. Iwata N, Higuchi HR. Responses of Japanese and American university students to the STAI items that assess the presence or absence of anxiety. J Pers Assess 2000; 74: 48-62.
14. Abdel-Khalek AM. The developmental and validation of an Arabic form of the STAI: Egyptian results. Pers Indiv Diff 1989; 10: 277-285.
15. Ahiawat KS. Family environmental determinants of text anxiety in Jordanian high school students. In: Schwarzer R, Van der Ploeg HM, Spielberger CD, editors. Advances in text anxiety research Lisse, The Netherlands: Swets & Zeitlinger; 1989.
16. Abdullatif QA. Adaptation of the State Trait Anxiety Inventory in Jordanian high school students. In: Schwarzer R, Van der Ploeg HM, Spielberger CD, editors. Advances in text anxiety research Lisse, The Netherlands: Swets & Zeitlinger; 1989.
17. Tayel KY, Attia MS, Mounier GM, Naguib KM. Anxiety among school age children suffering from asthma. J Egypt Public Health Assoc 2000; 75: 179-198.
18. Spielberger CD. Manual for the State-Trait Anxiety Inventory ST AI (Form Y). Palo Alto (CA): Consulting Psychologists Press; 1983.
19. Costello AB, Osborne JW. Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. Pract Assess Res Eval 2005; 10: 7.
20. Spielberger CD, Sharma S. Cross-cultural measurement of anxiety. In: Spielberger C, Diaz-Guerrero R, editors. Cross-cultural measurement of anxiety. Washington (DC): Hemisphere Publishing Co.; 1976. p. 13-25.
21. Bahammam MA, Hassan MH. Validity and reliability of an Arabic version of the modified dental anxiety scale in Saudi adults. Saudi Med J 2014; 35: 1384-1389.
22. Jensen MP, Karoly P, Braver S. The measurement of clinical pain intensity: a comparison of six methods. Pain 1986; 27: 117-126.
23. Lorenzo-Seva U, Ten Berge JMF. Tucker’s Congruence Coefficient as a Meaningful Index of Factor Similarity. Methodology 2006; 2: 57-64.
24. Mathen LK, Mathen BO. How to use a Monte Carlo study to decide on sample size and determine power. Struct Equ Modeling 2002; 4: 599-620.
25. Spielberger CD. State-Trait Anxiety Inventory for adults. Redwood (CA): Mind Garden; 2005.
26. Lim YJ, Kwon SM. The State-Trait Anxiety Inventory, Trait version: Examination of a method factor. Korean Social Science Journal 2007; 34: 31-48.
27. Barnes LLB, Harp D, Jung WS. Reliability generalization of scores on the Spielberg State-Trait Anxiety Inventory. Educ Psychol Meas 2002; 62: 603-618.
28. Fountoulakis KN, Papadopoulos M, Kleanthous S, Papadopoulos A, Bizeli V, Nimatoudis I, et al. Reliability and psychometric properties of the Greek translation of the State-Trait Anxiety Inventory form Y: preliminary data. Ann Gen Psychiatry 2006; 5: 2.
29. Biedling PJ, Antony MM, Swinson RP. The State-Trait Anxiety Inventory, Trait version: structure and content re-examined. Behav Res Ther 1998; 36: 777-788.
30. Gros DF, Antony MM, Simms LJ, McCabe RE. Psychometric properties of the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA): comparison to the State-Trait Anxiety Inventory (STAI). Psychol Assess 2007; 19: 369-381.
31. Acharya S. Factors affecting dental anxiety and beliefs in an Indian population. J Oral Rehabi 2008; 35: 250-267.
32. Liddell A, Locker D. Gender and age differences in attitudes to dental pain and dental control. Community Dent Oral Epidemiol 1997; 25: 314-318.
33. Settineri S, Tati F, Fanara G. Gender differences in dental anxiety: is the chair position important? J Contemp Dent Pract 2005; 6: 115-122.
34. Yuan S, Freeman R, Lahi S, Lloyd-Williams F, Humphris G. Some psychometric properties of the Chinese version of the Modified Dental Anxiety Scale with cross validation. Health Qual Life Outcomes 2008; 6: 22.
35. Luyk NH, Beck FM, Weaver JM. A visual analogue scale in the assessment of dental anxiety. Anesth Prog 1988; 35: 121-123.
36. Malvania EA, Ajikihkrishnan CG. Prevalence and socio-demographic correlates of dental anxiety among a group of adult patients attending a dental institution in Vadodara city, Gujarat, India. Indian J Dent Res 2011; 22: 179-180.
37. Desai VD, Gaurav I, Bhaloo DN. Dental anxiety - an area of concern for the oral physician - a study. J Indian Dent Assoc 2011; 5: 177-179.
38. Woolgrove J, Cumberbatch G. Dental anxiety and regularity of dental attendance. J Dent 1986; 14: 209-213.
39. UNESCO. World Arabic Language Day. [cited 2014 February]. Available from URL: http://www.unesco.org/new/en/unesco/events/prizes-and-celebrations/celebrations/international-days/world-arabic-language-day/