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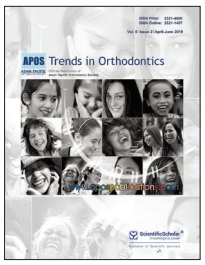

Original Article

Orthodontic patient satisfaction: Validation of an Arabic patient satisfaction questionnaire

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ABSTRACT

Objectives: Orthodontic patient satisfaction is a primary aim of orthodontic treatment. Satisfaction is a multidimensional concept, requiring multi-item questionnaires for it to be adequately assessed. A 58-item, orthodontic patient satisfaction questionnaire (PSQ) was developed to assess orthodontic patient satisfaction. Appropriately adapted assessment tools are needed to assess orthodontics patient satisfaction in different populations. The validity and reliability of such tools should be demonstrated before their use for each target population. The PSQ was yet to be validated in Arabic. Therefore, the objective of this study was to translate, adapt, and validate an Arabic orthodontic PSQ.

Material and Methods: The 58-item English PSQ was translated to Arabic through translation and back-translation. An expert panel examined the relevance of PSQ items. The questionnaire was circulated through social media to recruit responses from Arabic-speaking orthodontic patients who completed orthodontic treatment. Cronbach's alpha, item-total correlation (I-TC), and kappa reliability coefficient were calculated. The analysis of variance test was used to compare satisfaction scores between genders and different orthodontic treatment appliances.

Results: Ten items were removed based on expert ratings. The questionnaire was filled by 327 patients (55.6% females, mean age = 28.5 ± 7.2, 59.8% on metal braces, 35.3% on clear aligners, and 5.2% on tooth-colored braces). Nine questionnaire items were removed because of low I-TC (<0.3). The resulting 39-item questionnaire had a Cronbach alpha of 0.79 and a kappa coefficient of 0.82. The mean total PSQ score of the sample was 167.61 ± 21.45. Items with the top ten highest I-TC correlations had a Cronbach's alpha of 0.90. Patients on metal braces had a highest mean total PSQ score ($P = 0.004$). Among these patients, satisfaction with situational aspects was lower but satisfaction with dentofacial, psychosocial, and dental improvements were all higher compared to other orthodontic treatments ($P < 0.001$).

Conclusion: The 39-item Arabic PSQ is valid and reliable. A shorter collection of 10 items with high validity were identified. Patients on metal braces had better outcomes, driving higher satisfaction. Studies collecting satisfaction data using the PSQ from orthodontic clinics are needed.

Keywords: Arabic, Braces, Clear aligners, Orthodontic appliances, Orthodontic treatment, Satisfaction

INTRODUCTION

Patient-centered health care prioritizes patients' psychological, social, cultural, and economic value. It emphasizes incorporating patient requirements, preferences, and goals into treatment planning. These factors are integral to patient satisfaction.[1] Orthodontic patient satisfaction is a primary aim of orthodontic treatment. Satisfaction is a multidimensional concept, requiring multi-item questionnaires for it to be adequately assessed. Measurement of patient

satisfaction with orthodontic treatment has frequently been undertaken using generic oral health-related quality-of-life questionnaires.[2-4] However, these instruments were not originally designed for patients undergoing orthodontic treatment and are not directly applicable for use within this patient cohort. Appropriately modified assessment tools are needed to assess patient satisfaction in different orthodontic patient populations. The validity and reliability of such tools should be demonstrated before these tools can be used with confidence.[5]

A 38-item, orthodontic patient satisfaction questionnaire (PSQ) was developed to assess patient satisfaction after orthognathic surgery.[1] Subsequent studies expanded this questionnaire.[6] Twenty questions were added to create a questionnaire for use in orthodontic patients. This PSQ was divided into six sub-scales: the doctor–patient relationship, situational aspects of treatment, dentofacial improvement, psychosocial improvement, dental function, and a residual category. The questionnaire was then adapted, validated, and used in several countries, including the US, UK, the Netherlands, and others.[6-11] This tool was not validated in Saudi Arabia or similar contexts. It was previously used to study a sample of Saudi orthodontic patients, demonstrating that orthodontic patient satisfaction in this patient population was dependent on the doctor–patient relationship and being treated in the public health-care system.[8] These investigators relied on face validity of the PSQ, without modifying or validating it. Furthermore, the impact of orthodontic appliance choice on patient satisfaction is not completely understood. Previous studies have demonstrated higher quality of life among patients using clear aligner therapy. However, this was not studied within the framework of patient satisfaction and was not studied in the patient population of Saudi Arabia.

To bridge these gaps, this study aimed to translate to Arabic and validate the orthodontic PSQ to determine its content validity and reliability. In addition, this study used this questionnaire to demonstrate satisfaction in a sample of Arabic-speaking orthodontic patients who completed orthodontic treatment in Saudi Arabia.

MATERIAL AND METHODS

This study was approved by the Ethics Review Committee of the Faculty of Dentistry at King Abdulaziz University (#). The version of the PSQ that was used for translation and validation was in English and consisted of 58 items. To translate this version to Arabic, it was first translated by the author of this study, a proficient bilingual orthodontist. The questionnaire was then back-translated to English by a proficient bilingual dentist who was previously unfamiliar with the questionnaire. The author of this study then edited the Arabic-translated PSQ and sent it back to the dentist for another translation to English. After repeating this process twice, the English back translation matched the original English version of the PSQ. The final Arabic-translated PSQ was then used for this study.

The Arabic PSQ was then sent to an expert panel consisting of 10 Saudi consultant orthodontists. They were asked to provide their feedback about the readability, relevance, and face validity of the questionnaire. These panelists speak Arabic fluently and have practiced in Saudi Arabia for more than 10 years. The panel members were asked to rate the relevance of each of the PSQ items on a 4-point Likert scale, with a range from "0 = irrelevant" to "3 = highly relevant." Lynn's content validity ratio was used to determine PSQ item relevance.[7,12] For a panel of 10 experts, a question is considered non-essential and removed if three or more expert raters give it a validity rating of 0 or 1 (leading to a content validity ratio lower than 0.7). The expert orthodontists were also asked to provide feedback on the clarity phrasing and readability of the Arabic-translated PSQ, leading to minor linguistic modifications. Based on the panel's feedback, 10 questions were deemed irrelevant by three or more panel experts and had a content validity ratio of 0.62 or lower. These were questions 2, 5, 6, 18, 25, 40, 46, 48, 54, 56. The resulting PSQ consisted of 48 phrases. This version of the PSQ was used for further analysis in this study.

Next was to determine the construct validity and internal consistency of the resulting Arabic PSQ. This was achieved by asking a sample of orthodontic patients to rate the 48 PSQ items on a 5-point Likert scale ranging from "1: Completely disagree" to "5: Completely agree." The target sample size was estimated to be 300 orthodontic patients based on similar previous studies and a power calculation accepting a type 1 error of 5% and a type 2 error of 15% (alpha = 0.05, beta = 0.85, and Cohen's kappa = 0.5).[4,7] The sample was recruited through social media in a convenience sampling method. The inclusion criteria for the sample were: (i) Fluency in Arabic; (ii) having completed orthodontic treatment in Saudi Arabia and (iii) consent to participate in the study. Participants were asked to digitally sign a consent to participate in the study.

To examine the internal consistency and construct validity of the PSQ and its subscales, Cronbach's alpha coefficient was used. In addition, the item-total correlation (I-TC) was calculated. An I-TC cutoff of 0.3 or higher was used as the acceptable criterion for an item to remain in the questionnaire. Frequencies, proportions, Chi-square, Pearson's correlation, and analysis of variance (ANOVA) tests were used to describe the relationships between the independent variables of gender, type of orthodontic treatment, and orthodontic satisfaction scores. To test the reliability of the PSQ, 20 participants were asked to answer the questionnaire twice, two weeks apart. Reliability analysis was performed using the kappa coefficient of variability.

RESULTS

A total of 327 orthodontic patients completed the PSQ. Among study participants, 182 (55.66%) were females and 145 (44.34%) were males. The mean age of participants was 28.5 years with a standard deviation (SD) of 7.2 years. With regards to the type of orthodontic treatment, 195 (59.63%) had metal braces, whereas 115 (35.17%) had clear aligners and 17 (5.20%) had tooth-colored braces.

The Cronbach alpha of the 48-item PSQ was 0.72. The following nine items were found to have an I-TC value <0.3 and were therefore removed from the questionnaire: items 13, 14, 20, 24, 27, 30, 44, 50, 55. The resulting 39-item version of the questionnaire is shown in Appendix 1. [Table 1] shows Cronbach alpha values of this version of the PSQ and its subscales, showing an improved alpha of the entire questionnaire and acceptable Cronbach alpha values for subscales except for the miscellaneous category. Using data from the 20 subjects that answered the PSQ twice two weeks apart, the kappa coefficient was found to be 0.82, indicating good test-retest reliability.

The maximum possible total score of the 39-item PSQ was 195. The average PSQ score of the entire population was 167.61 (SD = 21.45). The maximum possible total scores for the PSQ subscales were 50 for situational aspects, 40 for the doctor–patient relationship, 30 for dentofacial improvement, 30 for psychosocial improvement, 15 for dental functions, and 30 for the miscellaneous category. The means of subscale scores were 40.12 for situational aspects (SD = 11.23), 36.01 for doctor–patient relationship (SD = 4.51), 14.71 for dentofacial improvement (SD = 9.25), 19.74 for psychosocial improvement (SD = 8.70), 11.82 for dental functions (SD = 3.42), and 21.32 for miscellaneous items (SD = 13.28). There were significant correlations between subscale scores and the total score ($P < 0.05$). The items with the 10 highest I-TC correlation are presented in [Table 2]. The Cronbach's alpha of the top 10 items was 0.90.

Using the ANOVA, we compared total satisfaction scores and subscale scores between genders and orthodontic treatment types. There was no significant difference between genders with regard to total and subscale satisfaction scores ($P > 0.05$). There was a significant difference between the means of satisfaction scores of patients with different orthodontic appliances. Patients with metal braces had a mean total score of 170.81 whereas patients with clear aligners had a mean score of 162.52 and patients with tooth-colored brackets had a mean total score of 165.75 ($P = 0.004$). [Table 3] demonstrates how there was no difference between these different orthodontic treatment types with regards to the doctor–patient relationship or the residual category subscale scores. Satisfaction with situational aspects was lower among patients on metal braces in comparison to clear aligners and tooth-colored braces (45.03 vs. 48.68 vs. 46.41, $P < 0.001$). However, subscale scores of satisfaction with dentofacial improvement, psychosocial improvement, and dental function were all higher among patients on metal braces than other orthodontic treatments.

Table 1: Cronbach alpha values of the PSQ and its subscales.

	Cronbach alpha value	Number of items
Entire questionnaire	0.79	39
Situational aspects	0.69	10
Doctor–patient relationship	0.68	8
Dentofacial improvement	0.82	6
Psychosocial improvement	0.79	6
Dental functions	0.88	3
Miscellaneous	0.34	6

PSQ: Patient satisfaction questionnaire

DISCUSSION

This study managed to translate, adapt, and validate a well-known orthodontic PSQ into a credible and reliable questionnaire to be used in the Saudi Arabian population and similar contexts. It was important to perform this translation and adaptation of the PSQ to ensure that the instrument maintains validity and reliability across cultures.[13] Culture and practice settings are known to alter how different aspects of the orthodontic treatment journey impact patient satisfaction.[4,14-17] The resulting Arabic PSQ has variations from the original and other adapted versions, demonstrating how these practice settings impart different levels of importance to the questionnaire items. This study used well-characterized methods to demonstrate that the modified Arabic 39-item PSQ was valid and reliable. In

Table 2: PSQ items with the highest I-TC values ($P<0.05$).

Item	I-TC
Orthodontic treatment was a good value for the money	0.82
I feel more outgoing because of orthodontic treatment	0.79
I personally liked the orthodontist (s) who treated me	0.76
The orthodontist (s) always checked their work carefully	0.74
When I look in the mirror, I feel very satisfied about the way my appearance has improved since orthodontic treatment	0.71
Before treatment began, my orthodontist (s) carefully explained what treatment would be like	0.68
Questions I had about my treatment were answered promptly	0.66
The treatment took much too long	0.63
I am satisfied with the results of my orthodontic treatment	0.61
Eating is easier since I have been treated	0.60

PSQ: Patient satisfaction questionnaire, I-TC: Item-total correlation

Table 3: Differences in PSQ subscale scores between patients on different orthodontic treatment types.

	Metal braces	Clear aligners	Tooth colored braces	*P*-value
Subscale scores				
Doctor–patient relationship	43.22	43.01	42.94	0.54
Situational aspects	45.03	48.68	46.41	<0.001
Dentofacial improvement	26.05	21.02	23.29	<0.001
Psychosocial improvement	31.88	27.35	29.12	<0.001
Dental functions	12.61	11.01	11.76	<0.001
Residual	12.01	11.68	11.71	0.46

PSQ: Patient satisfaction questionnaire

addition, this study identified a short list of 10 items that may be used to measure orthodontic patient satisfaction in a busy clinical practice with sufficient validity.

The average satisfaction score of this patient population was higher than average. This may reflect a selection bias as participation in this study was voluntary and patients with higher degrees of satisfaction may be more enthusiastic to participate in this survey. There was no significant difference between genders with regard to satisfaction in this study. Previous studies comparing satisfaction with orthodontic treatment between genders have been inconsistent but suggest females may generally be less satisfied than male patients.[4,7,18,19] The fact that this study did not show this effect may again be related to selection bias or under-representation of males in the study. This study found that patients with metal braces were more satisfied than patients with clear aligners and tooth-colored braces. Analyzing the subscale scores, it appears that this difference in satisfaction stems from better dentofacial, psychosocial, and dental improvements seen with metal braces. This is consistent with previous work that has shown that while clear aligners may be associated with subjective improvements in process-related aspects of treatment (e.g. pain and discomfort), there is insufficient evidence to suggest that there is an improvement in outcomes related to clear aligners in comparison to metal braces.[20]

In the Arabic-speaking patient population in Saudi Arabia, value for money had the strongest correlation with the total satisfaction score followed by items related to the psychosocial impact of treatment, and the doctor–patient relationship. This is in contrast, previous research found that the doctor–patient relationship was shown to be the most important factor in other patient populations.[4,21] The importance of value for money in this population is a unique finding. A previous survey of patient satisfaction in Eastern Saudi Arabia revealed that satisfaction was higher in the public sector where care is free in comparison to the private sector.[8] This may stem from the structure of medical services and socioeconomic factors in the country but other orthodontic factors may be at play.[22] Therefore, it is important to study patients' willingness to pay in this patient population and how it impacts patient satisfaction.

Limitations

The recruitment process from social media may have introduced a selection bias where patients who are enthusiastic about their experiences and outcomes in relation to orthodontic treatment may have been more likely to participate. Additional data using the Arabic PSQ in a clinical context where various degrees of satisfaction are more equally represented. Secondly, we did not have clinical orthodontic data such as malocclusion types and treatment outcome data because it would be inaccurate to rely on patient's reports for those data points.

CONCLUSION

There has been a limited number of studies of orthodontic patient satisfaction in Saudi Arabia and for Arabic-speaking orthodontic patients in general. This study methodically translated, adapted, and validated an Arabic version of the orthodontic PSQ in a sample of Arabic-speaking orthodontic patients living in Saudi Arabia. The study has important implications. It demonstrated sound measures of internal consistency and reliability for the PSQ. In addition, the study provided a shortened version of the PSQ, consisting of the top 10 items that may be used to quickly assess and track the satisfaction of Arabic-speaking orthodontic patients in Saudi Arabia and similar contexts. Furthermore, the study suggests that economic factors are of utmost importance to patients in this population, surpassing the doctor–patient relationship. This may be a consequence of the socioeconomic status of the population and the lack of insurance coverage for orthodontic treatment. Future prospective studies in clinical settings using this now validated tool are needed to track changes in patient satisfaction over an extended period of treatment.

This longitudinal approach provides valuable insights into trends, variations, and potential areas for improvement in orthodontic patient care.

Ethical approval: The research/study was approved by the Institutional Review Board at King Abdulaziz University Faculty of Dentistry, number 23/11/226, dated 3rd December 2023.
Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent.
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Use of artificial intelligence (AI)-assisted technology for manuscript preparation: The author confirms that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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