



Original Article

PATIENT SATISFACTION IN ORTHODONTIC CARE: A CROSS-SECTIONAL STUDY

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Submitted 20 November 2023, Accepted 5 January 2024

Abstract

Background: Public awareness of dental aesthetics is increasing, particularly in orthodontic care, which can improve patients' quality of life. Patient complaints often arise from unsatisfactory services, high treatment costs, and limited facilities, all of which affect satisfaction. Patient satisfaction is therefore an important measure of service quality.

Objective: To analyze patient satisfaction with fixed orthodontic treatment at the outpatient unit Soelastris Dental Hospital (Rumah Sakit Gigi dan Mulut-RSGM) by developing a modified measurement instrument, examining patient characteristics, and identifying satisfaction dimensions influencing service quality.

Methods: This study employed a cross-sectional approach, involving 45 patients selected purpose at RSGM Soelastris Surakarta. Three instruments, i.e. the Dental Satisfaction Questionnaire (DSQ), Dental Visit Satisfaction Scale (DVSS) and Survey Tool for Orthodontic Patient Satisfaction (STOPS) were modified and tested for validity and reliability to develop a comprehensive questionnaire adapted to the Indonesian context. Data analysis applied univariate, descriptive, bivariate, prior to multivariate analyses using multiple linear regression.

Results: Most respondents were female students with junior high school education. Overall satisfaction was high, with the lowest scores observed in the cost dimension. Female respondents reported higher satisfaction than male respondents, while respondents with senior high school education and those in the student occupational group demonstrated the highest satisfaction scores. Multivariate linear regression identified education ($p = 0.009$) and occupation ($p = 0.029$) as significant predictors of patient satisfaction, whereas gender was not statistically significant. Further analysis across eight satisfaction dimensions revealed that education and occupation significantly influenced the "Understanding and Acceptance" and "General Satisfaction" dimensions, whereas only education significantly affected the "Quality" dimension.

Conclusions: Patients were satisfied with fixed orthodontic treatment services at RSGM Soelastris Surakarta. Education and occupation were key factors influencing patient satisfaction, highlighting the importance of tailoring orthodontic care to patient demographics.

Keywords: Dental Satisfaction Questionnaire (DSQ), Dental Visit Satisfaction Scale (DVSS), Patient Satisfaction Instrument, Orthodontic Treatment, Survey Tool for Orthodontic Patient Satisfaction (STOPS)

Introduction

Dental aesthetics play a crucial role in social interaction, self-confidence, and perceived attractiveness.¹ Thus, facial aesthetics are a key element in social interaction.² Orthodontic treatment is designed to improve the appearance of teeth³, including enhancing aesthetics, restoring proper occlusion, and improving psychosocial well-being.⁴ Patient complaints often arise due to unsatisfactory healthcare services, high costs,

limited facilities and infrastructure, and other factors, all of which ultimately influence patient satisfaction with hospital services. Therefore, patient satisfaction is essential in evaluating the quality of treatment services and the operator's expertise in hospitals.⁵

In orthodontic care, patient satisfaction can be seen through the professional relationship between the practitioner and patient—such as motivating patients regarding the goals of their

orthodontic treatment to ensure their satisfaction. Additionally, the practitioner should use vocabulary that the patient can understand, fostering effective communication⁶. High-quality healthcare services positively impact patient satisfaction⁷⁻¹⁰. Increased patient satisfaction, in turn, promotes patient loyalty toward the hospital.¹¹

Previous studies have generally applied these instruments independently, each focusing on specific aspects of patient satisfaction. The Dental Satisfaction Questionnaire (DSQ) provides a comprehensive assessment of general dental service satisfaction, the Dental Visit Satisfaction Scale (DVSS) emphasizes visit-based communication and understanding, while Survey Tool for Orthodontic Patient Satisfaction (STOPS) is specifically designed to capture orthodontic-related patient experiences. To date, no standardized instrument has integrated the key strengths of these three validated tools into a single, culturally adapted questionnaire for fixed orthodontic care, particularly in the Indonesian hospital setting.

Therefore, the novelty of this study lies not in the reuse of existing instruments, but in the systematic integration, modification, and cross-cultural adaptation of selected dimensions from DSQ, DVSS, and STOPS into a new composite instrument. This approach enables a more comprehensive and context-specific evaluation of patient satisfaction in fixed orthodontic treatment, covering clinical, interpersonal, and service-related dimensions simultaneously.

Furthermore, the study contributes methodologically by validating the modified instrument through reliability and validity testing, providing empirical evidence that the integrated questionnaire is both reliable and applicable for assessing orthodontic patient satisfaction in outpatient hospital care. As such, this research addresses an existing gap by offering a validated, multidimensional, and context-appropriate measurement tool, rather than merely applying existing instruments in isolation.

Although these instruments are valuable, each has limitations when applied independently. DSQ provides breadth but is not orthodontic specific, DVSS emphasizes communication but lacks long term scope, and STOPS captures orthodontic concerns but is lengthy and requires adaptation. Therefore, integrating and modifying dimensions from DSQ, DVSS, and STOPS offers a more comprehensive framework for evaluating patient satisfaction in fixed orthodontic treatment.

This study aims to measure patient satisfaction dimensions in fixed orthodontic treatment services by developing a modified questionnaire based on DSQ, DVSS, and STOPS. The findings are expected to contribute to improved evaluation of orthodontic care quality and strengthen patient centered service delivery.

Methods

This study employed a quantitative research design, incorporating instrument validity and reliability testing, normality testing, as well as univariate, bivariate, and multivariate analyses.

The study population consisted of patients undergoing orthodontic treatment at the RSGM Soelastrri, Surakarta. The sample included patients who attended orthodontic treatment at RSGM Soelastrri between December 2022 and January 2023. Sampling was conducted using a purposive sampling technique. In quantitative research, purposive sampling is widely recognized as appropriate when the focus is on a specific

subgroup or context that directly aligns with the study questions and outcomes of interest. Recent methodological literature highlights that purposive sampling can enhance precision by targeting participants most likely to provide relevant information, thereby improving the explanatory power within a defined sampling frame, even in survey research. This approach is particularly suitable in clinical settings where the accessible population is small and narrowly defined, making simple random sampling or total sampling impractical during a limited data collection timeframe. Importantly, purposive sampling does not inherently bias respondent independence when operationalized transparently with clear inclusion and exclusion criteria and when respondents complete questionnaires independently without influence from researchers¹²⁻¹³.

The validity and reliability testing of the modified questionnaire was conducted as a pilot study involving ten respondents. This approach is consistent with established methodological recommendations for early-stage instrument development and cross-cultural adaptation. Pilot testing aims to assess item clarity, internal consistency, and preliminary construct validity rather than population-level inference.

Recent methodological guidelines indicate that pilot studies for questionnaire validation can be conducted with small samples, commonly ranging from 10 to 20 participants, particularly when the study population is limited¹⁴. Furthermore, studies on reliability estimation demonstrate that Cronbach's alpha can yield meaningful results even with small samples when the instrument measures relatively homogeneous constructs¹⁵. In addition, international guidelines for cross-cultural adaptation emphasize the importance of small-scale pilot testing to ensure semantic, conceptual, and cultural equivalence before large-scale administration¹⁶.

Furthermore, contemporary research on sample size determination for pilot reliability tests suggests that a minimum sample size (e.g., $n \approx 10$) can be sufficient to provide meaningful insights about internal consistency and item performance, particularly in initial development phases. This preliminary testing step ensures that the instrument measures the intended constructs reliably and validly before use in broader inference.

Participants were recruited based on a defined set of inclusion and exclusion criteria to ensure the reliability of the study population. Eligible respondents included conscious outpatients aged 12 years or older who were currently undergoing fixed orthodontic treatment and were capable of effective communication. Only those who provided informed consent were enrolled in the study. Conversely, patients were excluded if they were receiving treatment from professional students, presented with psychiatric disorders, or had not yet initiated their orthodontic procedures.

The research utilized a modified questionnaire synthesized from three validated instruments: the Dental Satisfaction Questionnaire (DSQ) by Davies and Ware, the Dental Visit Satisfaction Scale (DVSS) by Corah et al., and the Survey Tool for Orthodontic Patient Satisfaction (STOPS). Relevant dimensions from these tools were selected, reformulated into Bahasa Indonesia, and culturally adapted to suit the local context at RSGM Soelastrri Surakarta. The psychometric properties of this modified instrument were rigorously evaluated, with validity assessed through Guilford's classification and reliability determined via the Cronbach's Alpha method to ensure high internal consistency. Statistical analysis was conducted using SPSS, beginning with the Kolmogorov-Smirnov test to evaluate data normality and

determine the suitability of parametric assumptions. Univariate analysis was first employed to describe participant demographics—including age, gender, occupation, and education alongside the distribution of satisfaction scores, with results presented as frequencies, percentages, means, and standard deviations. This was followed by bivariate analysis to examine associations between patient characteristics and satisfaction dimensions using Chi-square tests, Independent t-tests, or ANOVA, as appropriate for the data distribution. Finally, a multivariate analysis was performed via multiple linear regression to identify independent predictors of satisfaction, incorporating variables that reached a significance level of $p < 0.05$ in the bivariate stage. For all statistical procedures, a p-value of less than 0.05 was considered the threshold for significance.

Ethics approval was obtained from the Ethics Commission of the Faculty of Medicine, Universitas Gajah Mada (Reference No: KE/FK/1600/EC/2022)

Results

Development of the Patient Satisfaction Instrument

After identifying the dimensions of patient satisfaction, statements were formulated for each dimension. The number of statements varied across dimensions. The patient satisfaction questionnaire consisted of two sections: (1) general respondent profile and (2) patient satisfaction dimensions. Respondent profiles were collected using closed ended questions, while satisfaction statements were rated on a 4 point Likert scale ranging from strongly disagree to strongly agree. A total of 25 items were initially developed (Table 1).

Table 1. Patient Satisfaction Instrument

Dimension	Sub-Dimension	Statement
Information and Communication	A1	After speaking with the orthodontic specialist, I understand the condition of my mouth.
	A2	After speaking with the orthodontic specialist, I have a clear idea of the changes to expect in my dental health over the next few months.
	A3	The orthodontic specialist informed me of everything I wanted to know about my dental issues.
	A4	I continuously receive updates about the progress of my orthodontic treatment.
	A5	It is very easy to ask questions whenever I want to.
	A6	The orthodontic specialist explains the procedures in an easy-to-understand manner.
	A7	The assistant is friendly.
Understanding and Acceptance	B8	I truly feel understood by my orthodontic specialist.
	B9	I feel that this orthodontic specialist truly understands how uncomfortable I am about the potential for pain.
Technical Competence	C10	The orthodontic specialist is meticulous and knows exactly what they are doing during the procedure.
	C11	The orthodontic specialist is too rough when treating me.
Quality	D12	The orthodontic specialist is very thorough in checking all aspects of my dental condition during the examination.
	D13	The orthodontic specialist always explains what they will do and the cost before starting treatment.
	D14	The orthodontic specialist's office is very modern and up-to-date.
Continuity	D15	The treatment results so far have exceeded my expectations.
	E16	I see the same orthodontic specialist each time I come in for treatment.
Cost	F17	The orthodontic treatment costs are too high.
	F18	The orthodontic specialist always avoids unnecessary patient expenses.
Accessibility	G19	I often have to wait a long time before being called for my orthodontic treatment.
	G20	It is difficult to get an appointment for immediate orthodontic treatment.
General Satisfaction	G21	The practice hours suit my schedule.
	H22	There are things about the orthodontic treatment I received that could be improved.
	H23	I am satisfied with what my orthodontic specialist has done.
	H24	I am satisfied with the progress of my orthodontic treatment.
	H25	I would recommend this treatment to my friends.

Patient Satisfaction in Orthodontic Care

Respondent Characteristics and Satisfaction Distribution

The study comprised a total of 45 respondents, with the demographic profile heavily skewed toward younger populations and students. Females represented most of the sample at 68.9%, and 92.6% of all participants were under the age of 31. Regarding professional and educational backgrounds, 80% of respondents were students, while the most common educational attainment was the junior high school level (37.8%). Prior to inferential testing, data normality was verified using the Shapiro-Wilk test; the resulting significance value of 0.074 ($p > 0.05$) confirmed a normal distribution, thereby justifying the use of parametric statistical methods. Bivariate analysis was subsequently conducted using correlation tests, though age was

excluded from this stage due to an uneven distribution across the sample.

Bivariate analysis was conducted to determine whether or not there is a relationship between the dependent variable and independent variables using correlation tests. The age variable was excluded from the bivariate analysis due to the imbalance in the age range used as a benchmark in this study, which could render the analysis results inaccurate (under 30 years accounted for 95.6%, while over 30 years accounted for only 4.4%). The following analysis was performed to determine the relationship between gender, education level, and occupation of respondents with satisfaction toward fixed orthodontic treatment services RSGM Soelastri, Surakarta using the Caesar Orthodontic Visit Satisfaction Instrument (COVSI).

Table 2. The Relationship Between Respondents' Gender and Patient Satisfaction.

Gender	n	Mean	Std. Deviation	Std. Error Mean	p
Female	31	82.68	7.842	1.408	0.281
Male	14	79.57	8.364	2.235	

Based on table 2, it shows the mean satisfaction score for female respondents was 82.68, while for male respondents it was 79.57. This indicates that female patients were more satisfied with fixed orthodontic treatment services at Soelastri Dental and Oral Hospital compared to male patients. However, the relationship between respondents' gender and patient satisfaction showed a significance value of 0.281 ($p > 0.05$). Therefore, it can be concluded that gender does not have a significant effect on patient satisfaction.

Based on table 3, it shows the high school education level had the highest mean satisfaction score of 85.54. Meanwhile, the elementary school education level recorded a mean of 75.75, junior high school 79.65, and higher education (Diploma/Bachelor's Degree) 82.55. The overall mean satisfaction score of all samples was 81.71. However, the relationship between respondents' education level and patient satisfaction showed a significance value of 0.061 ($p > 0.05$). Therefore, it can be concluded that education level does not have a significant effect on patient satisfaction.

Table 3. The Relationship Between Respondents' Education Level and Patient Satisfaction

Education	n	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min.	Max.	p
					Lower Bound	Upper Bound			
Elementary	4	75.75	9.287	4.644	60.97	90.53	64	85	
Junior High School	17	79.65	8.046	1.952	75.51	83.78	67	93	
Senior Highschool	13	85.54	7.090	1.966	81.25	89.82	73	93	
Diploma/Bachelor	11	82.55	7.326	2.209	77.62	87.47	71	91	
	45	81.71	8.044	1.199	79.29	84.13	64	93	0.061

Table 4. The Relationship Between Respondents' Occupation and Patient Satisfaction.

Employment	n	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min.	Max.	p.
					Lower Bound	Upper Bound			
Student	36	81.89	8.321	1.387	79.07	84.70	64	93	
Employee (Civil Servant, Private Sector & Entrepreneur)	9	81.00	7.228	2.409	75.44	86.56	71	91	
	45	81.71	8.044	1.199	79.29	84.13	64	93	0.902

Based on table 4, it shows the satisfaction scores between students and employees were nearly identical, although student satisfaction was slightly higher than that of employees, with students recording a mean of 81.89 and employees 81.00. The table above shows that the overall mean satisfaction score of all samples was 81.71.

However, the relationship between respondents occupation and patient satisfaction showed a significance value of 0.902 ($p > 0.05$). Therefore, it can be concluded that occupation does not have a significant effect on patient satisfaction.

The findings indicated that female respondents generally reported higher average satisfaction levels compared to their male counterparts. Furthermore, participants with a senior

high school education and those within the student occupational group exhibited the highest average satisfaction scores relative to other educational levels and occupations. To further examine these relationships, a multivariate linear regression was performed, which identified education ($p = 0.009$) and occupation ($p = 0.029$) as significant predictors of overall patient satisfaction. When this analysis was expanded across eight specific satisfaction dimensions, the results revealed that both education and occupation significantly influenced the "Understanding and Acceptance" and "General Satisfaction" dimensions. However, for the "Quality" dimension, only education remained a statistically significant factor (Table 5)

Table 5. Regression analysis of respondent characteristics on patient satisfaction.

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	80.266	1.962	.000	40.915	.000
Gender	-4.102	2.565	.117	-1.599	.117
Education	2.272	.835	.009	2.722	.009
Occupation	-8.353	3.693	.029	-2.262	.029

Discussion

The final sample of 45 respondents provided a focused look into the demographic and psychosocial drivers of orthodontic satisfaction. By utilizing a 24-item Likert scale with reversed scoring for negative statements, the study captured a nuanced view of patient perceptions.

The demographic breakdown revealed a participant profile that was predominantly female (68.9%), under the age of 31 (92.6%), and students (80%).²³ This skew toward younger populations is significant in a discussion of satisfaction. Adolescence is a critical period of psychosocial development where facial aesthetics and dental alignment are central to self-image. Consequently, the high prevalence of younger patients in this study reflects a developmental drive to improve functional and aesthetic outcomes through orthodontic intervention.

Bivariate analysis highlighted interesting disparities in satisfaction, particularly regarding gender. While age was excluded from correlation testing due to the heavy distribution toward those under 30, gender emerged as a descriptive factor, with females reporting higher mean satisfaction (82.68) than males (79.57).

Furthermore, the descriptive data indicated that high school graduates and students reported higher mean satisfaction levels compared to other educational and occupational groups, suggesting that social role and educational background may color the patient experience.

The multivariate linear regression provided a more rigorous assessment of these predictors, revealing that when gender, education, and occupation were analyzed together, only education ($p = 0.009$) and occupation ($p = 0.029$) remained significant predictors of overall satisfaction. While gender

differences may appear in isolation, they are less influential than socioeconomic and educational factors when considered holistically. Detailed regression across the eight satisfaction dimensions further elucidated these relationships. The significant influence of education and occupation on the "Understanding and Acceptance" dimension underscores the critical role of the orthodontist's empathy.

Treating patients as "human beings" rather than just clinical subjects is essential; this study confirms that patients with different educational and professional backgrounds perceive this interpersonal connection differently.²⁰ Additionally, the significant impact of education on the "Quality" and "General Satisfaction" dimensions reinforces the idea that service quality and professionalism are not perceived uniformly. Patients with higher educational attainment may have different expectations regarding technical competence and communication, which ultimately shapes their confidence in the provider and their overall satisfaction with the orthodontic experience.

Patient satisfaction is shaped by predisposing factors such as knowledge, attitudes, education, and occupation. Higher education is associated with broader knowledge, greater health awareness, and better acceptance of information. Occupation, linked to income, also influences healthcare utilization and preventive behaviors.

Patient satisfaction with dental and orthodontic services can be evaluated through fulfillment of service quality dimensions. Satisfaction fosters patient loyalty, ensuring continued use of hospital services. Demonstrated that satisfaction positively and significantly influences loyalty.²³ Thus, satisfaction and loyalty are strategic pillars for hospital sustainability. Hospitals must understand the relationship between service quality, satisfaction, and loyalty to maintain long term patient engagement. Overall, most respondents reported being satisfied, particularly in the dimensions of understanding and acceptance, quality, and general satisfaction.²⁴

Conclusion

This study demonstrates that patient satisfaction with fixed orthodontic treatment is significantly influenced by educational background and occupation. These factors shape perceptions of care quality, understanding and acceptance, and overall satisfaction, highlighting the importance of demographic considerations in evaluating orthodontic services. The modified questionnaire, developed by integrating dimensions from DSQ, DVSS, and STOPS, proved to be a valid and reliable instrument for capturing patient experiences in a comprehensive manner.

The findings carry important implications for clinical practice and hospital management. For clinicians, the results emphasize the need to tailor communication strategies and treatment approaches to patients' educational levels and occupational contexts. Orthodontists should prioritize empathy, clear explanations, and professional competence to strengthen patient trust and satisfaction. For hospital administrators, the study underscores the value of systematically monitoring patient satisfaction as a quality indicator. By addressing dimensions such as understanding and acceptance, service quality, and general satisfaction, hospitals can enhance patient loyalty and long-term engagement. Ultimately, patient satisfaction is not only a reflection of treatment outcomes but also of the broader service environment. Integrating patient feedback into continuous quality improvement processes will help ensure that orthodontic care remains patient centered, sustainable, and aligned with evolving expectations in healthcare delivery.

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