

# Parental Satisfaction with Their Children's Rapid Palatal Expansion Treatment Provided by Orthodontists and Pediatric Dentists

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**Background:** Dentofacial problems have a definitive impact on patients' psychological well-being, quality of life, and satisfaction. Therefore, patients' satisfaction with their dentition should be an essential goal for dental caregivers.

**Aim:** To compare parental satisfaction with their children's rapid palatal expansion treatment outcome provided by orthodontists and pediatric dentists.

**Materials and Methods:** The authors reviewed 605 medical records and contacted 134 parents whose children received early orthodontic treatment from orthodontists and pediatric dentists using a rapid palatal expander. Eighty-eight parents (65.7%) responded to a validated questionnaire about patients' satisfaction with orthodontic treatment outcomes.

**Results:** At baseline; there were no significant differences in relation to parent-related demographic variables. However, there were statistically significant differences between patients' ages and treatment duration ( $p < 0.001$ ). Independent  $t$ -tests showed statistically significant differences in the means for the subscales of doctor-patient relationship and situational aspects ( $p < 0.05$ ). Spearman's rho correlation coefficients and multivariate linear regression analysis showed that the overall satisfaction is significantly related to, and can be predicted by, parents' educational level, child's gender, and the specialty of the dentist who provided the treatment ( $p < 0.05$ ).

**Conclusion:** Overall parental satisfaction with their children's rapid palatal expansion treatment is significantly higher when provided by pediatric dentists as compared with orthodontists. Factors related to doctor-patient relationship and situational aspects (ie, office location and design, appointment waiting, and treatment duration) significantly impacted parental satisfaction.

**Keywords:** rapid palatal expansion, parents' satisfaction, pediatric dentists, orthodontists

## Introduction

Dentofacial problems have a definitive impact on patients' psychological well-being, quality of life, and satisfaction.<sup>1-4</sup> Therefore, patients' satisfaction with their dentition should be an essential goal for dental caregivers. A successful orthodontic treatment must achieve an improved esthetics and a stable functional occlusion.<sup>5</sup> Satisfaction with orthodontic treatment outcome can be related to subjective and objective aspects, based on patient/parent perception and professional assessment, respectively. Several authors have examined the relationship between subjective factors and patient satisfaction such as doctor-patient

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interactions,<sup>6</sup> occlusion stability perception,<sup>7–9</sup> tooth alignment,<sup>9</sup> patients' personality traits,<sup>10,11</sup> and patients' motivation.<sup>12</sup> Parents expect orthodontic treatment to improve their children's dental health and benefit them on a socio-occupational level.<sup>13</sup>

Despite early orthodontic treatment (EOT) being a controversial topic, multiple studies have shown varying degrees of its benefits.<sup>14–20</sup> Worldwide, previous studies have reported the need for EOT ranging from 21.3% to 59.2%.<sup>21–25</sup> In Saudi Arabia, studies reported a similar range, from 21% to 42.8%.<sup>26–28</sup> The majority of orthodontists recommend that the first orthodontic examination should be performed at the age of seven years, and when needed, EOT should be performed.<sup>29,30</sup> Various data have been reported regarding pediatric dentists providing orthodontic treatment. Previous studies indicate that around 60% to 62% of pediatric dentists provided orthodontic treatment.<sup>31,32</sup> In Saudi Arabia, it was reported that 38.8% of pediatric dentists practice orthodontics regularly.<sup>33</sup>

Very few studies have evaluated patients' satisfaction with their orthodontic treatment in Saudi Arabia, which reported high degrees of satisfaction.<sup>34,35</sup> To our knowledge, no studies have been conducted in Saudi Arabia to compare the outcome of rapid palatal expansion (RPE) treatment between orthodontists and pediatric dentists when measured by parental satisfaction. Therefore, the aim of this study is to evaluate the parental satisfaction with their children's RPE outcome provided by orthodontists and pediatric dentists.

## Materials and Methods

The ethical approval for this study was obtained from the Scientific Research Unit at the College of Medicine, Prince Sattam Bin Abdulaziz University, Alkharij, Riyadh (ethical approval #PSAU/COM/RC/IRB/P/58). In accordance with the Declaration of Helsinki, the participants were informed about the purpose of the study before they consented to participate. The inclusion criteria included parents of healthy children aged from six to twelve years, who received RPE to correct posterior crossbite using a fixed rapid palatal expander and have completed treatment within the last six months. Patients with craniofacial anomalies were excluded from the study. We reviewed 605 recodes of children who received RPE provided by orthodontists and pediatric dentists at five public dental centers or hospitals in Riyadh, Saudi Arabia. We identified 134 children who met the inclusion criteria and

contacted their parents, whereby 88 parents (65.7%) participated in the study.

We adopted a previously validated patient satisfaction questionnaire,<sup>36</sup> and included 21 items. The original questionnaire consisted of two parts; the first part included socio-demographic questions such as gender and age of parent and child, educational level of parents and the specialty of the dentist who provided the treatment. The second part measured the patient's satisfaction with orthodontic treatment. The questionnaire comprised of six categories exploring patient satisfaction with: 1) doctor–patient relationship, 2) situational aspects of the orthodontic clinic, 3) dentofacial improvement, 4) psychosocial improvement, 5) dental function, and 6) a residual category. Some of the items in the original questionnaire were removed because they were not relevant to patients' experiences and parents' perception of the treatment outcome in the current study, or they were not applicable to how orthodontists and pediatric dentists practice clinically in Saudi Arabia.

The five-point Likert scale questionnaire was translated into Arabic using a "Dual-Panel" translation method. A bilingual panel of four members who are proficient in both English and Arabic performed independent translations, followed by generating all versions in a panel meeting. The panel's goal was to generate a valid translated questionnaire in Arabic that can be easily understood by parents. The translated questionnaire was then reviewed by a monolingual panel of eight native Arabic speakers with different educational backgrounds, followed by a focus group discussion to ensure the translated Arabic terms are easily understood. Participants were contacted and briefed about the purpose of the study before they consented to fill out the survey. The questionnaire was distributed and filled out electronically.

Data were analyzed using SPSS program version 22 (IBM Corp. Armonk, NY, USA). We used Chi-square tests to determine differences in demographic variables related to patients and parents. We used independent *t*-tests to compare differences in parental satisfaction with their children's RPE outcome provided by orthodontists and pediatric dentists. We also used Spearman's rho correlation coefficients to analyze the relationship between parental overall satisfaction and the demographic characteristics of patients and their parents. Lastly, we used multivariate linear regression to assess the impact of care provided by orthodontists and pediatric dentists, on the likelihood of parental overall satisfaction, controlling for

**Table 1** Results of Chi-Square Comparing the Baseline Demographic Variables between Orthodontists' and Pediatric Dentists' Patients

	Orthodontists (N = 44) %	Pediatric Dentists (N = 44) %	p-value
<b>Parents' variables</b>			
Age: ≤40	N = 19 (43.2%)	N = 21 (47.7%)	0.669
Gender: Female	N = 20 (45.5%)	N = 29 (65.9%)	0.053
Education level			0.519
Illiterate, Primary-to-High-School	N = 16 (36.4%)	N = 16 (36.4%)	
Bachelor Graduate (MS or PhD)	N = 17 (38.6%) N = 11 (25%)	N = 21 (47.7%) N = 7 (15.9%)	
<b>Patients' variables</b>			
Age: 6–8	N = 0 (0%)	N = 11 (25%)	<0.0001* 0.088
Gender: Female	N = 27 (61.4%)	N = 19 (43.2%)	
<b>Treatment duration</b>			
≤ 6 months	N = 2 (4.5%)	N = 17 (38.6%)	0.0001*
6–12 months	N = 12 (27.3%)	N = 12 (27.3%)	1.00
> 12 months	N = 30 (68.2)	N = 15 (34.1%)	0.0014*

**Note:** \*Statistically significant.

demographic factors. Statistical significance was set at  $p$ -value < 0.05.

## Results

### Demographics

We used Chi-square tests to determine if there were statistically significant differences between categorical baseline demographic characteristics of patients (and their parents) treated by orthodontists or pediatric dentists (Table 1). No differences were found in relation to parent-related demographic variables. However, there were statistically significant differences between patients' age and treatment duration ( $p < 0.001$ ). Regarding patients' age,

treatment of all eleven patients between the age of six to eight years was provided by pediatric dentists ( $p < 0.0001$ ). Regarding treatment duration, a significantly higher number of patients treated by pediatric dentists had a treatment duration of less than six months, compared to those treated by orthodontists ( $p < 0.0001$ ). On the contrary, a significantly higher number of patients treated by orthodontists had a treatment duration of six months or less ( $p < 0.0001$ ) and more than twelve months ( $p < 0.01$ ), compared to those treated by pediatric dentists.

### Parental Satisfaction

Independent  $t$ -tests were used to compare differences in the scaled mean values for overall satisfaction and the six dimensions or subscales of doctor–patient relationship, situational aspects, dentofacial improvement, psychosocial improvement, dental function, and residual category, between orthodontists and pediatric dentists. Statistically significant differences were found only in means for the subscales of doctor–patient relationship and situational aspects ( $p < 0.05$ ). See Table 2.

Independent  $t$ -tests were also used to compare differences in parents' responses to individual items in the satisfaction questionnaire between orthodontists and pediatric dentists. Of the 21 items, six items were statistically significant (Table 3). These items were: 1) "I personally liked the orthodontist(s) who treated my child", 2) "questions I had about the treatment were answered promptly", 3) "the dentist was respectful", 4) "the treatment took about as long as I expected it would", 5) "the office was modern and conveniently located", and 6) "we were rarely kept waiting for appointments". The means for all these six items were higher for pediatric dentists than for orthodontists ( $p < 0.05$ ).

**Table 2** Results of Independent  $t$ -tests for the Subscales and Overall Satisfaction with Orthodontic Care Provided by Orthodontists and Pediatric Dentists

Scale	No. of Items	Orthodontists (N = 44)	Pediatric Dentists (N = 44)	p-value
		Scaled Mean ±SD	Scaled Mean ±SD	
Doctor-patient relationship	5	4.52±.74	4.83±.33	0.016*
Situational aspects	6	4.11±.77	4.47±.56	0.014*
Dentofacial improvement	4	4.01±1.21	4.30±.74	0.187
Psychosocial improvement	2	4.03±1.25	4.36±.73	0.135
Dental function	1	4.07±1.00	4.27±.79	0.289
Residual category	3	3.95±1.20	4.17±.69	0.296
Overall satisfaction	21	4.16±.89	4.46±.46	0.05

**Note:** \*Statistically significant.

**Table 3** Results of Independent *t*-tests Comparing Responses to Individual Items of the Satisfaction Questionnaire between Orthodontists and Pediatric Dentists

	Orthodontists	Pediatric Dentists	p-value
	Mean $\pm$ SD	Mean $\pm$ SD	
<b>Personally, I liked the dentist who treated the child/Child liked dentist who performed treatment</b>	4.23 $\pm$ 1.22	4.77 $\pm$ .42	0.007*
Dentist always checked their work carefully	4.59 $\pm$ .84	4.84 $\pm$ .37	0.077
Dentist carefully explained treatment before it began	4.57 $\pm$ .82	4.77 $\pm$ .48	0.156
<b>Questions were answered promptly</b>	4.55 $\pm$ .70	4.82 $\pm$ .39	0.027*
<b>Dentist was respectful</b>	4.66 $\pm$ .68	4.91 $\pm$ .29	0.029*
Treatment fees were too high	4.55 $\pm$ .88	4.52 $\pm$ .85	0.902
<b>Treatment duration was as expected</b>	3.84 $\pm$ 1.24	4.36 $\pm$ .78	0.020*
Problems were managed promptly	4.20 $\pm$ 1.05	4.41 $\pm$ .66	0.276
<b>Office was modern and conveniently located</b>	3.93 $\pm$ 1.15	4.45 $\pm$ .76	0.014*
Adequate time was spent with child	4.32 $\pm$ .96	4.59 $\pm$ .62	0.118
<b>Rarely kept waiting for appointment</b>	3.84 $\pm$ .96	4.50 $\pm$ .73	0.001*
Posttreatment child has straighter teeth	3.98 $\pm$ 1.30	4.39 $\pm$ .78	0.078
Posttreatment child has better bite	4.00 $\pm$ 1.20	4.27 $\pm$ .86	0.221
Posttreatment child has attractive smile	4.02 $\pm$ 1.21	4.20 $\pm$ .82	0.412
Posttreatment child has more attractive face	4.05 $\pm$ 1.22	4.32 $\pm$ .74	0.209
Improved self-esteem	4.02 $\pm$ 1.30	4.45 $\pm$ .73	0.059
Academic performance is better	4.05 $\pm$ 1.26	4.27 $\pm$ .85	0.322
Improved chewing/mastication	4.07 $\pm$ 1.00	4.27 $\pm$ .79	0.289
Associated discomfort	3.89 $\pm$ 1.24	4.02 $\pm$ .82	0.546
Satisfied with treatment	4.05 $\pm$ 1.24	4.43 $\pm$ .70	0.076
Difficulty wearing/using the appliance	3.93 $\pm$ 1.25	4.07 $\pm$ .97	0.569

**Note:** \*Statistically significant.

## Correlations

We used Spearman's rho correlation coefficients to analyze the relationship between parental overall satisfaction and baseline demographic characteristics of patients and their parents. There were small negative and statistically significant correlations between parental overall satisfaction and their educational level ( $r = -0.34$ ,  $p < 0.001$ ), as well as child gender ( $r = -0.29$ ,  $p < 0.001$ ).

## Multivariate Regression Analyses

We used multivariate linear regression to assess the impact of care provided by orthodontists and pediatric dentists on the likelihood of parental overall satisfaction, controlling for other factors such as parents' age, gender, and educational level, patients' age and gender, as well as treatment duration (Table 4). After controlling for demographic factors, results indicated that there was a statistically significant difference in overall parental satisfaction with care

provided by orthodontists and pediatric dentists ( $p < 0.05$ ). Therefore, we reject the main research hypothesis that parental overall satisfaction is not different when care is provided by orthodontists or pediatric dentists.

Multivariate linear regression models were also conducted including the six dimensions or subscales of doctor-patient relationship, situational aspects, dentofacial improvement, psychosocial improvement, dental function, and residual category as the dependent variables. Statistically significant differences were found in the dimensions of situational aspects and dental function. Regarding situational aspects, and after controlling for demographic factors, results displayed in Table 5 indicate that there was a statistically significant difference in parental satisfaction with care provided by orthodontists and pediatric dentists ( $p < 0.01$ ). Regarding dental function, child gender, as a control variable, was the only significant predictor of parents' satisfaction. Out of the total  $R^2 = 0.221$ , the unique  $R^2$  contribution of child

**Table 4** Multiple Regression Model for Overall Satisfaction with Orthodontic Care between Orthodontists and Pediatric Dentists

Independent Variables	Parameter Estimate	±SE	p-value
<b>Intercept</b>	4.38	0.37	0.000*
Parent gender (female)	0.11	0.16	0.50
Parent age (≤40)	0.08	0.16	0.60
<b>Patient gender (female)</b>	−0.37	0.16	0.02*
Patient age (6–8)	−0.003	0.27	0.992
Parent education (Bachelor)	−0.33	0.18	0.07
<b>Parent education (Graduate)</b>	−0.54	0.21	0.01*
Treatment duration (6–12 months)	0.03	0.24	0.90
Treatment duration (>12 months)	0.10	0.22	0.67
Orthodontist vs pediatric dentists	0.41	0.18	0.02*
Model fit	0.03		
R <sup>2</sup>	0.45		

**Note:** \*Statistically significant.

**Table 5** Multiple Regression Model for the Dimension of Situational Aspects of Orthodontic Care between Orthodontists and Pediatric Dentists

Independent Variables	Parameter Estimate	±SE	p-value
<b>Intercept</b>	4.53	0.34	0.000*
Parent gender (female)	0.16	0.15	0.28
Parent age (≤40)	−0.05	0.15	0.74
<b>Patient gender (female)</b>	−0.40	0.15	0.008*
Patient age (6–8)	−0.03	0.25	0.92
<b>Parent education (Bachelor)</b>	−0.41	0.19	0.015*
<b>Parent education (Graduate)</b>	−0.56	0.17	0.005*
Treatment duration (6–12 months)	0.02	0.22	0.94
Treatment duration (>12 months)	−0.01	0.21	0.96
Orthodontist vs pediatric dentists	0.44	0.16	0.007*
Model fit	0.006		
R <sup>2</sup>	0.25		

**Note:** \*Statistically significant.

gender was 0.14 ( $p < 0.01$ ). The other resulting models showed no statistically significant differences in the remaining four dimensions or subscales of satisfaction with care provided by orthodontists and pediatric dentists.

## Discussion

We evaluated parental satisfaction with their children's rapid palatal expansion (RPE) treatment outcome provided by orthodontists and pediatric dentists. We included patients who had their treatment completed within six months from initiating the study, since it has been shown that time period between treatment completion and

satisfaction assessment could affect the perception of treatment outcome.<sup>8,37</sup> Also, we included children who received RPE at public dental centers with fixed palatal expanders in order to minimize the effect of other confounding factors that have been shown to have a slight association with orthodontic treatment outcome satisfaction, such as patient compliance,<sup>9</sup> appliance type,<sup>38</sup> or type of dental center (public vs private).<sup>34</sup> At baseline, all patients under the age of eight years were treated by pediatric dentists, which could be attributed to the fact that children at this age are still being seen by their pediatric dentists.



Addressing the primary aim of this study, and in agreement with Baheti and colleagues (2015),<sup>39</sup> we found a statistically significant difference in overall parental satisfaction. Mascarenhas et al (2005), however, reported insignificant differences.<sup>40</sup> It should be noted that the authors of these studies used different questionnaires and included patients who had comprehensive orthodontic treatment. Moreover, it should be noted that these are the only studies that can be compared to the current study. We also found statistically significant differences in the means for the subscales of doctor–patient relationship and situational aspects. Our findings can be explained, mainly, by pediatric dentists' better patient relationship and behavioral management, as perceived by parents. Furthermore, parents were more satisfied with pediatric dentists because of situational aspects including office location and design, appointment waiting, and treatment duration. In other words, patients treated by orthodontists had longer treatment and their parents perceived that they were kept longer in the waiting area before their children's visits, compared to those who have been treated by pediatric dentists. It has been shown that patients demonstrated higher levels of satisfaction with their dental treatment when they were met on time by their doctors and had short dental visits.<sup>41</sup> In 2015, a systematic review concluded that dissatisfaction with orthodontic treatment was associated with longer treatment duration.<sup>42</sup> Several studies have reported varying periods of time for retention after rapid palatal expansion, ranging from three to nine months.<sup>43–46</sup> In this study, the majority of patients treated by orthodontists had their expanders for more than a year, which contributed to their parents' lower satisfaction with the treatment outcome.

Our correlational and regression analyses showed that overall satisfaction is significantly related to, and can be predicted by, parents' educational level, child gender, and the specialty of the dentist who provided the treatment. In other words, parents with higher levels of education, parents of female patients and parents whose children were treated by orthodontists were less satisfied with their children's treatment. To our knowledge, no study has explored the relationship between parents' educational level and their satisfaction with their children's orthodontic treatment. However, Kim et al reported higher satisfaction expressed by orthodontic patients with only elementary school education compared with more educated patients.<sup>47</sup> With regards to gender, previous authors who explored its relationship with orthodontic treatment

satisfaction found no significant relationship,<sup>6–8,10,48</sup> while others found it to be significantly related.<sup>7,36</sup> Interestingly, and at baseline, parents' educational level and child gender were not significantly different between orthodontists' and pediatric dentists' groups.

One of the limitations of this study is the subjective nature of using a questionnaire that depends on the patients'/parents' experience and perception. Others have included an objective evaluation of the orthodontic treatment outcome,<sup>9</sup> which may not necessarily be reflective of patient satisfaction. Also, the questionnaire we used had fewer items than the original validated questionnaire, which may have affected its sensitivity to elicit more differences. Another limitation of this study is that we did not evaluate other factors that have been strongly associated with orthodontic treatment outcome dissatisfaction, such as pain,<sup>48</sup> retention appliances,<sup>8,9</sup> and neuroticism.<sup>10</sup> In the context of the current study, parental higher satisfaction with pediatric dentists does not necessarily equate to higher quality of orthodontic treatment outcome. Therefore, caution must be taken when interpreting our results. The findings of this study were based exclusively on self-reported responses of parents whose children underwent maxillary expansion to correct posterior crossbite. Thus, it should be borne in mind that our study represents a specific population group and a highly selected sample with relatively strict inclusion criteria and treatment protocol. Consequently, the results from this study can neither be generalized nor applied to other clinical contexts. In other words, we caution against generalizing our findings to all orthodontists and pediatric dentists across different clinical scenarios.

## Conclusion

Overall parental satisfaction with their children's rapid palatal expansion treatment outcome provided by orthodontists and pediatric dentists was significantly different, as parents reported higher satisfaction with pediatric dentists. This study highlights the importance of dimensions related to doctor–patient relationship and situational aspects on satisfaction with rapid palatal expansion treatment.

## Disclosure

The authors report no conflicts of interest in this work.

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