SCIENTIFIC ARTICLE

Parents' Satisfaction With Their Child's Orthodontic Care: A Comparison of Orthodontists and Pediatric Dentists

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Abstract

Purpose: The purpose of this study was to compare the quality of orthodontic care between orthodontists and pediatric dentists when measured by parental satisfaction.

Methods: Six pediatric dentists and 5 orthodontists participated in the study. Quality of care was measured using the peer assessment rating (PAR) occlusal index, treatment duration, and parental satisfaction. Parental satisfaction was evaluated using a 25-item questionnaire measuring 3 dimensions: (1) treatment process; (2) psychosocial effects of treatment; and (3) treatment outcomes. The questionnaire items were scored on a scale of "strongly disagree" to "strongly agree."

Results: At baseline, no differences were seen in the gender, starting dentition, and permanent teeth extractions of patients treated by the orthodontist and pediatric dentists. Statistically significant differences were seen in patients': (1) pretreatment age; (2) race; (3) primary teeth extractions; (4) treatment stages; and (5) pre-PAR scores. No statistically significant differences between orthodontists and pediatric dentists were observed regarding overall parental satisfaction or the dimensions of satisfaction. These results did not change after controlling for potential confounding factors such as patient's age, gender, starting dentition, treatment stage, extraction recommendations, pre-PAR score, treatment duration, and percentage PAR reduction.

Conclusions: The quality of orthodontic care, when measured by parental satisfaction, was similar between orthodontists and pediatric dentists. This indicates that, as far as parents are concerned, pediatric dentists performed orthodontic treatment to the same high standard as orthodontists. (Pediatr Dent 2005;27:451-456)

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Patient satisfaction with care is a useful measure that evaluates care, including the quality of care and provider-patient relationships. It has been used in medicine for several years and, as reflected in the recent literature, is increasingly being reported in dentistry.[1-5] With the shift in medicine and dentistry to patients being "consumers" of care and the concept of "consumerism," inclusion of patients' opinions in assessment of services has gained greater prominence.[6] Patient satisfaction measures mainly the "process" of care, broadly defined as the professional activities associated with providing care.[7,8] Measuring patient satisfaction allows for evaluation of health systems, particularly comparisons between different models of care delivery.

Patient satisfaction is a multidimensional concept.[9,10] Dimensions of dental care satisfaction that have been identified are:

1. technical or aspects of care related to the process of diagnosis and treatment;
2. interpersonal;
3. accessibility/availability;
4. financial access;
5. efficacy/outcomes;
6. continuity of care;
7. facilities;
8. general attitudes about overall care.[9,10]

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In orthodontics, only recently have studies been designed to measure satisfaction with care provided.[11-14] Most of the dimensions that are being measured are similar to those in general dental practice. The additional dimensions measured are the psychosocial effects of orthodontic treatment and outcomes of treatment.[11-14]

The Institute of Medicine report "Dental Education at the Crossroads" and the associated background papers in the *Journal of Dental Education*[15,16] have encouraged educators to improve their knowledge of "what works and what does not work in the prevention and treatment of oral health problems." The concepts of "evidence-based" treatment and "patient-centered" treatment now rightly dominate the priorities of dental educators and research workers. The American Dental Association's publication on dental practice parameters for oral health conditions state "balancing individual patient needs with scientific soundness is a necessary step in providing care."[17]

This study is part of a larger project designed to evaluate quality, cost, and value of orthodontic treatment in 3 dental care delivery systems. The aim of this paper is to report on parental satisfaction with orthodontic treatment provided by orthodontists and pediatric dentists in private practice. Parental satisfaction with orthodontic treatment was compared to test the null hypothesis that "no differences exist in parental satisfaction between those children treated by orthodontists and pediatric dentists."

Methods

This study was conducted in the private practices of orthodontists and pediatric dentists in the Columbus, Ohio, area. The selection of orthodontists and pediatric dentists was purposive. Several were known by the investigators or their colleagues and were invited to participate. Criteria used in the selection of clinicians were that they routinely took initial and post orthodontic treatment study models. The posttreatment study models were taken within 6 months of completion of treatment. Five orthodontists and 6 pediatric dentists agreed to participate in the study and signed the necessary consent forms approved by the Institutional Review Board of The Ohio State University. To be included, patients had to:

1. be under 18 years of age;
2. be receiving interceptive (relieve crowding, correction of crossbite) or comprehensive orthodontic treatment only;
3. have completed treatment.

Patients who had orthognathic surgery or craniofacial anomalies were excluded. All eligible consecutive patients treated over a similar time frame, beginning in January 1997 to March 2002, were enrolled in the study regardless of gender, ethnicity, or malocclusion type. Patients signed consent forms approved by the University's Institutional Review Board. The final sample included 157 cases treated by the orthodontists and 121 cases treated by the pediatric dentists.

Data were collected from 3 sources:

1. patient chart reviews using a clinic data collection form;
2. study models before and after orthodontic treatment;
3. a self-administered parental satisfaction questionnaire at the end of orthodontic treatment.

Collected from the patients' charts were:

1. Demographic information;
2. clinical and treatment information such as:
   a. type of malocclusion;
   b. stage of treatment;
   c. extraction recommendation;
   d. treatment delivered;
   e. treatment duration.

Treatment duration was measured from the date appliances were placed to completion of treatment in months and in number of appointments. Only the period during which active treatment occurred was considered in "duration" of treatment. Treatment stage was defined as 1 stage or 2 stage. For a 2-stage treatment, there was a requirement of at least 6 months between the end of a stage and beginning of the next stage of treatment.

The peer assessment rating (PAR) occlusal index, a validated and extensively used index, was used as a measure of occlusal outcome.[18,19] The PAR index is strictly a dental analysis measuring upper and lower anterior segments, buccal occlusion, overjet, overbite, and centerline, not involving any skeletal parameters. Study models are scored before (pre-PAR) and after (post-PAR) treatment. The change in score (percent PAR reduction) reflects the reduction in severity of the treated malocclusion, providing a quantifiable measure of treatment-related change. The study models were scored by one of the authors who was calibrated and recalibrated annually against the "gold standard" for the PAR occlusal index. Because models could not be removed from the private practices, the examiner was not blinded to the site in which the patient was treated.

The patient satisfaction questionnaire was a 25-item instrument that was developed and validated by Bennett et al.[11] This questionnaire is scored on a 5-point Likert scale from a "strongly disagree" to "strongly agree" and evaluated 3 dimensions of care: (1) treatment process (13 items); (2) psychosocial effects of treatment (7 items); and (3) treatment outcomes (5 items).

Data management and analyses

Standardized data collection and management procedures were followed to ensure data quality control. A direct data entry program using Epi Info version 6.0 (Centers for Disease Control and Prevention, Atlanta, Ga) was developed that customizes data entry and allows for data organization, data verification, and checks. After the initial entering of the data, data was verified through duplicate entry.

Statistical analyses were carried out using Epi Info version 6.0 and the SAS (SAS Institute, Inc, Cary, NC) system. Epi Info was used first to derive or code new variables such

as the 3 dimensions of satisfaction. By adding the responses of the individual questions and dividing by 25, overall satisfaction was derived. Each dimension subscale was derived similarly.[11] Epi Info was also used to obtain descriptive statistics and frequency distributions of all the data set variables. A new data set was then made using Epi Info so that it could be exported into SAS for further analysis. The statistical procedures were used to evaluate the differences in baseline characteristics such as: (1) age; (2) race; (3) gender; (4) starting dentition and pre-PAR scores; (5) clinical quality of care; (6) treatment duration; and (7) parental satisfaction of patients treated by either orthodontists or pediatric dentists. These statistical procedures included:

1. chi-square tests to determine if the observed differences between categorical or ordinal outcomes were statistically significant;
2. analysis of variance (ANOVA) to evaluate the difference in continuous outcomes;
3. odds ratios (OR) with 95% confidence intervals (CI) to measure the association between dichotomous outcomes.

The main hypothesis that there was no difference in overall parental satisfaction in patients treated by orthodontists and pediatric dentists was tested using multiple linear regression. Also tested using multiple linear regression were 3 subhypotheses that suggested there was no difference in the: (1) dimensions of treatment process; (2) psychosocial effects of treatment; and (3) treatment outcomes. The main independent variable of interest was the provider (orthodontist vs pediatric dentists). These analyses also controlled for all potential confounders such as patient's age, gender, starting dentition, treatment stage, extraction recommendations, pre-PAR score, treatment duration, and post-PAR or percent PAR reduction.

Results

Baseline characteristics such as age, race, gender, starting dentition, and pre-PAR scores of patients treated by orthodontists or pediatric dentists were evaluated (Table 1). No differences were found in the gender, starting dentition, and extraction recommendations in permanent teeth. There was, however, a statistically significant difference seen regarding the patients': (1) pretreatment age (P=.003); (2) race (P<.0001); (3) extraction recommendations in primary teeth (P=.04); (4) number of treatment stages (P=.0007); and (5) pre-PAR scores (P=.001). On average, patients treated by the pediatric dentists were about 9 months younger (11.4±1.9 years) than those treated by orthodontists (12.1±2.0). The patients treated by pediatric dentists were more racially diverse. The orthodontist's patients were 12.5 times more likely to be white than the pediatric dentists' patients (P<.0001). Orthodontists were 3 times more likely than pediatric dentists to extract primary teeth. The majority of this study's cases were 1 stage. Only 18 cases—17 by orthodontists and 1 by pediatric dentists—were 2 stages. Orthodontists were about 14 times more likely to treat 2-stage cases then pediatric dentists (P=.0007). Patients treated by the orthodontists had a higher pre-PAR score of 25.1±10 compared to those treated by pediatric dentists (21.3±8.5; P=.001).

Table 1. Results of ANOVA and Chi-square Comparing the Baseline Demographic Variables Between Orthodontists' and Pediatric Dentists' Patients

	Orthodontists (N=157) % or mean±SD	Pediatric dentists (N=121) % or mean±SD	*P* value
Gender: Female	62%	53.7%	.18
Starting dentition: Mixed	53%	55.5%	.63
Extractions:			
Permanent	12%	5%	.06
Primary	10%	3%	.04*
Pretreatment age	12.1±2 ys	11.4±1.9 ys	.003*
Race: White	99%	86%	<.0001*
Treatment stage: 1	89%	99%	.0007*
Pre-PAR	25.1±10	21.3±8.5	.001*

*Statistically significant.

Table 2. Results of ANOVA for the Subscales and Overall Satisfaction With Orthodontic Care Provided by Orthodontists and Pediatric Dentists

		Orthodontists N=157	Pediatric dentists N=121	
Scale	No. of items	Scaled mean±SD	Scaled mean±SD	*P* value
Treatment process	13	4.41±0.53	4.46±0.53	.59
Psychosocial effects	7	3.56±0.79	3.62±0.68	.53
Treatment outcome	5	4.20±0.54	4.23±0.48	.56
Overall satisfaction	25	4.09±0.44	4.08±0.37	.81

Parental satisfaction

Table 2 gives the scaled mean and standard deviation (SD) for the overall satisfaction and the 3 dimensions or subscales of treatment process, psychosocial effects of treatment, and overall treatment outcome between the orthodontists and pediatric dentists. The values for the scaled mean for the 2 delivery systems

Table 3. Results of ANOVA Comparing Responses to Individual Items of the Satisfaction Questionnaire Between Orthodontists and Pediatric Dentists

	Orthodontists mean±SD	Pediatric dentists mean±SD	*P* value
Dentist was gentle	4.58±0.67	4.59±0.56	.86
Academic performance is better	2.98±0.94	2.96±0.87	.98
Improved self-esteem	4.01±0.85	3.89±0.91	.29
Treatment fees too high	2.76±0.92	2.62±0.82	.13
Dentist carefully explained treatment before it began	4.54±0.64	4.46±0.66	.25
Given full explanation of office procedures pretreatment	4.47±0.61	4.42±0.65	.55
Better career opportunities for child	3.61±1	3.65±0.84	.91
Posttreatment child has straighter teeth	4.73±0.57	4.65±0.54	.09
Well informed of child's progress during treatment	4.38±0.78	4.49±0.7	.22
Adequate time was spent with child	4.43±0.73	4.53±0.58	.49
Child liked dentist who performed treatment	4.49±0.68	4.47±0.65	.7
Orthodontic care could have been better	1.75±0.78	1.84±0.75	.2
Satisfied with treatment	4.54±0.69	4.57±0.56	.99
Fully informed of costs before treatment	4.61±0.61	4.39±0.82	.02*
Questions were answered promptly	4.58±0.59	4.53±0.52	.25
Child more confident posttreatment	3.95±0.84	3.90±0.83	.53
Would still seek orthodontic treatment for child	4.61±0.64	4.68±0.52	.49
Assistants were gentle	4.50±0.69	4.48±0.59	.51
Staff was respectful	4.65±0.57	4.64±0.5	.81
Child more outgoing posttreatment	3.42±0.96	3.55±0.81	.36
Posttreatment child has better bite	4.41±0.74	4.36±0.72	.46
Posttreatment child has more attractive face	4.04±0.95	4.11±0.87	.76
Treatment area clean, sanitary	4.71±0.56	4.68±0.47	.26
Posttreatment child is more popular	2.90±0.85	2.98±0.72	.4
Dentist was respectful	4.62±0.64	4.60±0.56	.53

*Statistically significant.

were very similar, resulting in no statistically significant differences in means for overall satisfaction (P=.81) or the subscales of treatment process (P=.59), psychosocial effects of treatment (P=.53), and treatment outcome (P=.56).

When parents' responses to individual items in the satisfaction questionnaire were compared between the orthodontists and pediatric dentists, only 1 of the 25 items was statistically significant (Table 3). This item was "dentist fully informed me of costs before treatment" (P=.02). The mean for this item was higher for the orthodontists than for the pediatric dentists.

Multivariate linear regression was used to test the hypothesis that parental satisfaction was not different between the orthodontists and pediatric dentists when controlling for other factors such as patients' age, gender, race, starting dentition, extraction recommendations, starting difficulty using pre-PAR, treatment duration, and the occlusal outcome using percent PAR reduction (Table 4). No statistically significant differences were seen in parental satisfaction with care provided by orthodontists or pediatric dentists (P=.59) when controlling for these other factors. Multivariate linear regression models were also employed using the dimensions or subscales of treatment process, psychosocial effects of treatment, and treatment outcome as the dependent variables. The resulting models were similar to those seen in Table 4, with no statistically significant differences seen in the dimensions or subscales of satisfaction with care provided by orthodontists and pediatric dentists.

Discussion

This report focuses on parental satisfaction with orthodontic care provided by orthodontists and pediatric dentists as an outcome measure of the quality and value of the care provided. The satisfaction questionnaire used was developed and validated by Bennett et al to measure consumer satisfaction with orthodontic treatment.[11] The questionnaire was used to measure:

Table 4. Multiple Regression Model for Satisfaction With Orthodontic Care Between Orthodontists and Pediatric Dentists

Independent variable	Parameter estimate	±SE	*P* value
Intercept	4.04	±0.34	<.0001
Pretreatment age	0.007	±0.02	.66
Gender (female)	0.10	±0.06	.06
Race	0.03	±0.05	.53
Starting dentition	-0.04	±0.06	.46
Treatment stage	-0.11	±0.12	.39
Primary tooth extraction	-0.002	±0.11	.99
Permanent tooth extraction	-0.04	±0.03	.26
Pre-PAR	-0.002	±0.003	.50
% PAR reduction	0.0009	±0.001	.42
Treatment duration	-0.0009	±0.002	.63
Orthodontist vs pediatric dentists	-0.03	±0.06	.59

1. overall parental satisfaction with their child's orthodontic treatment;
2. 3 dimensions or subscales of:
   a. treatment process;
   b. psychosocial effects of treatment;
   c. overall treatment outcome.

Results of bivariate and multivariate analyses showed no significant differences in overall parental satisfaction or any of the subscales between the orthodontists and pediatric dentists. These results indicate that parents of patients treated by orthodontists and pediatric dentists were equally satisfied with the 2 delivery systems. One reason for this result could be that patient satisfaction scores are generally on the favorable side of the response midpoint, as was the case in this study. This, therefore, leaves little room for improvement. Other possible explanations for the results are that the questionnaire was not sensitive enough to elicit difference in parental satisfaction or that dimensions measured by the satisfaction instrument did not meaningfully differ between the orthodontists and pediatric dentists.

The only item of the satisfaction instrument that was statistically significant was "fully informed of costs before treatment" (Table 3). This item belonged to the "treatment process" dimension in Table 2. The mean was higher for the orthodontists then for the pediatric dentists, indicating that parents were more satisfied with the orthodontists. The mean for both orthodontists and pediatric dentists, however, was between "agree" and "strongly agree," and the difference was very small numerically (0.22 on a scale of 1 to 5), raising the issue of clinical significance. Raising parental satisfaction any higher would be very hard.

Comparing this study's results to other studies in the literature is limited because there are no studies that evaluated parental satisfaction with orthodontic care between orthodontists and pediatric dentists. Further, comparing this study's results to the other studies that evaluated satisfaction with orthodontic care among orthodontists is also limited because many of these studies were performed in university settings,[12,13] not private practices, and the instruments used to measure satisfaction were different.[12-14]

One of the limitations of this study is bias—specifically investigator and selection bias. Although objective inclusion criteria in the selection of clinicians were applied, such as initial and final study models' availability, it must be pointed out that the orthodontists and pediatric dentists who agreed to participate in the study were volunteers. Those who volunteered were probably confident in their abilities and perceived themselves as highly skilled. The bias, therefore, is expected to be random, which would not affect the results in any one direction. The voluntary nature of the orthodontists and pediatric dentists agreeing to participate in the study affects the results' generalizability. Hence, generalizing these results to all orthodontists and pediatric dentists is cautioned.

The authors' results showed that there were statistical differences in the pre-PAR scores between the orthodontists and pediatric dentists. This was expected, because the complexity of the cases these providers treat is different. Orthodontists typically treat more complex cases than pediatric dentists, while pediatric dentists treat more interceptive cases.

A potential for examiner bias could have existed because the PAR scorer was an orthodontist who was not blinded to the setting in which the patient was treated. To bias the study results in favor of the orthodontists, however, the PAR examiner would have to know which parts of the PAR score to consistently over- or underestimate. Given that the PAR score is a weighted and composite score, this would be unlikely. Further, it was only at the time of the analyses that the pre-PAR, post-PAR, and percent PAR reduction were calculated by an objective epidemiologist (AKM) who was unbiased concerning either of the specialties.

Other limitations include the questionnaire used to measure parents' satisfaction with orthodontic care. Although this instrument has been validated, it was developed for use and validated in orthodontists. It is possible that the questionnaire did not measure dimensions that were meaningfully different between the 2 types of providers, such as issues with patient behavior and management, which are known to be higher in those patients treated by pediatric dentists.

Conclusions

Based on this study's results, the following conclusions can be made:

1. The quality of orthodontic care, when measured by parental satisfaction, was similar between orthodontists and pediatric dentists.
2. This indicates that as far as parents are concerned, pediatric dentists performed orthodontic treatment to the same high standard as orthodontists.

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