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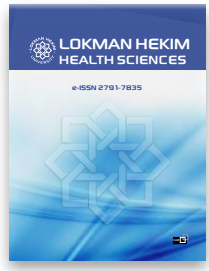

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ORIGINAL ARTICLE

Parental Perception Versus Orthodontic Assessment of Early Treatment Needs in Pediatric Patients

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Abstract

Introduction: Malocclusion is among the most common oral health problems in children, with potential effects on function, esthetics, and psychosocial well-being. Early orthodontic intervention can mitigate these consequences; however, parental awareness is critical in recognizing the need for treatment. This study aimed to compare parents' perception of their children's orthodontic treatment needs with professional assessment and to evaluate the prevalence of malocclusion in children.

Methods: A cross-sectional study was conducted on children aged 8–12 years and both of their parents attended the pedodontics clinic. Parents completed a 19-item questionnaire based on the esthetic component of the index of orthodontic treatment need (IOTN). Children were clinically examined by an orthodontist using IOTN and Angle's classification. Data were analyzed using Statistical Package for the Social Sciences v26 with Chi-square tests and correlation analysis. Associations between parental perception and professional assessment were analyzed using Pearson's Chi-square or Fisher's exact tests, as appropriate. Effect sizes were calculated using Phi coefficient or Cramer's V. Statistical significance was set at $p<0.05$.

Results: The study included 298 children. The most prevalent malocclusion was Angle Class II (55%), followed by Class I (37.5%) and Class III (7.7%). More than half of the parents (51.3%) were unaware of early orthodontic treatment needs. A strong association was found between fathers' education level and correct estimation of children's dental appearance ($p<0.001$, Cramer's V=0.555). Mothers with higher education were significantly more accurate in assessing malocclusion ($p<0.001$, Cramer's V=0.515). Overall, parents' ability to correctly identify their child's malocclusion was limited.

Discussion and Conclusion: Parental awareness regarding children's malocclusion and the need for early orthodontic treatment was insufficient. Professional evaluation revealed that Class II malocclusion was the most prevalent type. Educational interventions targeting parents may improve awareness and timely orthodontic care.

Keywords: Awareness; Early orthodontics; Malocclusion; Parents' perception; Prevalence; Treatment need

Malocclusion is one of the most prevalent oral health problems after dental decay and periodontal disease, affecting both function and esthetics. It is defined as any deviation from normal occlusion, such as crowding, spacing, or abnormal relationships between the jaws. Malocclusion may contribute to periodontal complications, impaired mastication and speech, increased risk of trauma, and psychosocial problems. A pleasing smile and harmonious

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dentition, on the other hand, are closely linked with self-confidence and social acceptance, particularly during childhood and adolescence.[1]

The etiology of malocclusion is multifactorial, involving genetic predisposition, environmental influences, deleterious oral habits such as thumb sucking, and developmental anomalies.[2] Early identification and management are therefore essential to minimize complications. Interceptive orthodontic treatment during the mixed dentition stage has been shown to reduce the severity of developing malocclusions, create space for erupting permanent teeth, and improve oral health outcomes.[3,4] For this reason, the American Association of Orthodontists recommends orthodontic evaluation by the age of seven.

To guide clinical decision-making and public health policies, various indices have been developed to measure orthodontic treatment needs. Among them, the index of orthodontic treatment need (IOTN) is one of the most widely used and validated tools. It comprises two components: The dental health component (DHC), which reflects the professional evaluation of treatment need, and the esthetic component (AC), which reflects the subjective perception of dental appearance.[5] These indices are widely employed in epidemiological surveys and clinical research to provide objective criteria for treatment priority.[6]

While professional evaluation is essential, the role of parents is central in initiating orthodontic treatment for children. Parents act as the primary decision-makers seeking care, and their awareness, attitudes, and socioeconomic status strongly influence treatment uptake. Several studies have demonstrated that parents may underestimate or fail to recognize their children's malocclusion, delaying timely intervention, and increasing the risk of more complex treatment in adolescence.[7,8] Conversely, higher parental education levels have been associated with greater accuracy in identifying malocclusion and willingness to pursue orthodontic treatment.[9]

Despite the importance of parental awareness, limited data exist in Turkey regarding how accurately parents perceive their children's orthodontic needs compared with professional assessment. Addressing this knowledge gap is crucial for improving preventive strategies, promoting timely orthodontic care, and informing public health policies.

This study aimed to (1) determine the prevalence of malocclusion among children aged 8–12 years, (2) evaluate parents' awareness and perception regarding their children's orthodontic treatment needs, and (3) compare parental assessments with professional evaluations using the IOTN.

Materials and Methods

Study Sample and Design

This cross-sectional study was conducted after receiving ethical approval from the Ethical Committee of Istanbul Yeni Yüzyıl University (Date: 06.07.2021, Decision: 2021/07/-695), and written informed consent was provided by all parents.

The sample size was determined using G*Power 3, which indicated a minimum of 210 participants to achieve adequate statistical power. However, the study sample, composed of 300 children aged 8–12 years and their parents, was obtained using convenience sampling from children attending routine dental visits at a single university clinic, and the power analysis was not intended to imply population representativeness. Two patients and their parents were excluded from the study due to incomplete questionnaires.

Exclusion criteria were age outside the 8–12 range or ongoing orthodontic treatment. Both parents completed a 19–item questionnaire adapted from previous studies[10,11] as shown in Table 1. The first section gathered demographic data, while the second evaluated awareness of orthodontic treatment needs, oral habits, and esthetics. Parents were also asked to select the photograph that best matched their child's dentition from AC (Fig. 1) of the IOTN described by Brook and Shaw[5] and modified by Richmond in 1990.[12]

Children underwent intraoral examinations by a calibrated orthodontist under natural light. Evaluations were performed according to both the AC and DHC (Table 2) [5] of the IOTN. The examiner also evaluated malocclusion according to Angle's Classification of Malocclusion.

This study was conducted in accordance with the Declaration of Helsinki.

Statistical Analysis

Data were analyzed using Statistical Package for the Social Sciences version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were calculated. Associations between categorical variables were evaluated using Pearson's Chi-square test. When expected cell counts were insufficient (i.e., cells with expected frequencies <5), Fisher's exact test was applied. Effect sizes for categorical comparisons were calculated using the Phi coefficient (φ) or Cramer's V, as appropriate for table dimensions. These effect size measures were used to quantify the strength of associations rather than correlation. Statistical significance was set at $p<0.05$.

Table 1. Questionnaire used for this study

Section A									
Q1	Parent's Name and Surname:								
Q2	Child's Name and Surname:								
Q3	Address:								
Q4	Age of your child								
Q5	Father's level of education								
	( )Primary school	( )High school	( )Bachelor degree	( )Master degree	( )Other				
Q6	Mother's level of education								
	( )Primary school	( )High school	( )Bachelor degree	( )Master degree	( )Other				
Section B									
Q8	Do you observe any protrusion or forward inclination of your child's teeth?								
	( )YES	( )NO							
Q9	Do you think your child is interested in or desires to undergo orthodontic treatment?								
	( )YES	( )NO							
Q10	Which of the following reasons do you think applies to why your child should not undergo orthodontic treatment?								
	( )My child is not concerned about the appearance of their teeth.								
	( )My child has difficulty keeping their teeth clean.								
	( )My child has difficulty coping with long and complex treatments.								
Q11	Have you heard about orthodontic treatment before?								
	( )YES	( )NO							
Q12	Do you think orthodontic treatment is costly?								
	( )YES	( )NO							
Q13	Do you think thumb sucking has an effect on the position of the front teeth?								
	( )YES	( )NO							
Q14	Have you seen anyone wearing braces?								
	( )YES	( )NO							
Q15	Have you ever undergone orthodontic treatment yourself?								
	( )YES	( )NO							
Q16	Has anyone ever advised you to have your child's teeth aligned?								
	( )YES	( )NO							
Q17	Are you aware that certain oral habits can be corrected through orthodontic treatment?								
	( )YES	( )NO							
Q18	Are you aware that teeth alignment can affect facial appearance?								
	( )YES	( )NO							
Q19	Select the number of the photo (AC component of IOTN) that most closely resembles your child's teeth appearance.								
	( )1	( )2	( )3	( )4	( )5	( )6	( )7	( )8	( )9	( )10

Results

At the beginning, 300 children and their parents were asked to fill in the questionnaires, but as parents of two children did not fill in the questionnaires as described, they were excluded from the study sample. The study sample was completed with 298 children and their parents.

Based on Angle's molar classification, the most prevalent malocclusion was Class II (55.0%), followed by Class I (37.5%) and Class III (7.7%). According to the IOTN, a considerable proportion of children demonstrated orthodontic treatment need.

Parental awareness was generally low: 51.3% of parents reported no knowledge of early orthodontic treatment,

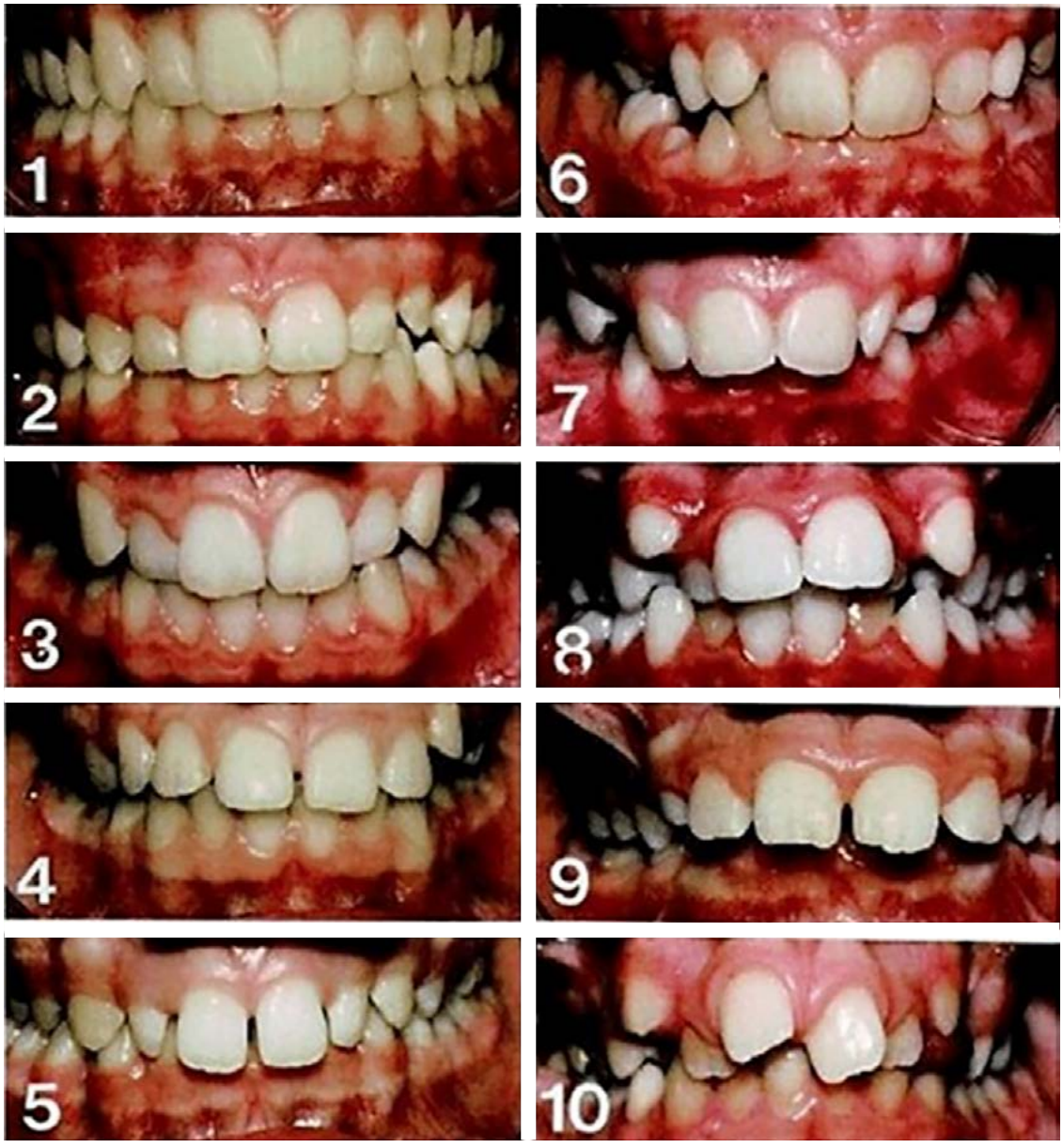

Figure 1. The esthetic component of the index of orthodontic treatment need (scale 1–10). 1–4: Little or no treatment need; 5–7: Borderline treatment need; 8–10: Great treatment need.

and fewer than half (48.7%) correctly matched their child's occlusion with the IOTN AC. Associations between parental perception and professional assessment were evaluated using Chi-square–based analyses, and effect sizes were interpreted using the Phi coefficient or Cramer's V.

Child's gender (p=0.294) and age (p=0.199) were not significantly associated with parental accuracy. A strong association was found between fathers' education level and accuracy of assessment (p<0.001, Cramer's V=0.555). Similarly, mothers with higher education were significantly more accurate in evaluating their child's occlusion (p<0.001, Cramer's V=0.515) (Table 3).

When considering both parents' accuracy, fathers were overall more accurate than mothers (57.3% vs. 43.2%, p=0.017, r=0.138) (Table 4).

According to the questionnaires, 54.4% of parents had heard of orthodontic treatment before, and they were correlated with significantly higher correct guessing (70.4%) than those who had not heard of it before (22.8%) (p<0.001, r=0.474) (Table 5).

Discussion

This study demonstrated that Class II malocclusion was the most common type among children in the study sample,

Table 2. The dental health component of the index of orthodontic treatment need (IOTN) (scale 1–5) reproduced from.[12]

	M	O	C	D	O
IOTN 5	Cleft lip & Palate Impacted / Ectopic teeth Hypodontia >4 missing teeth	> 9mm Overjet > -3.5mm reverse Overjet			
IOTN 4	Supernumeraries Hypodontia <4 missing teeth	> 6mm Overjet -2mm to -3.5mm reverse Overjet	Crossbite with >2mm displacement between RCP and ICP	> 4mm contact point displacement	Deep Overbite + Trauma >4mm Anterior Open Bite
IOTN 3		> 4mm Overjet <-2mm reverse Overjet	Crossbite with >1mm displacement between RCP and ICP	<4mm contact point displacement	Deep Overbite (no trauma) <4mm Anterior Open Bite
IOTN 2		>2mm Overjet		<2mm contact point displacement	
IOTN 1				Minimal irregularity	

IOTN 1: Almost perfection (no treatment need); IOTN 2: Minor irregularities (little treatment need); IOTN 3: Greater irregularities which normally do not need treatment for health reasons (borderline treatment need); IOTN 4: More severe degrees of irregularity and these do require treatment for health reasons (treatment need); IOTN 5: Severe dental health problems (very great treatment need).

Table 3. A comparison of how accurately both parents assess their child's malocclusion according to their education

Education level	Father's education	NC	C	Mother's education	NC	C
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Primary school	18 (6.1)	17 (94.4)	1 (5.6)	47 (15.8)	42 (89.4)	5 (10.6)
Middle school	16 (5.4)	14 (87.5)	2 (12.5)	31 (10.4)	22 (71)	9 (29)
Secondary school	147 (49.5)	102 (69.4)	45 (30.6)	119 (39.9)	70 (58.8)	49 (41.2)
Bachelor's degree	105 (35.4)	18 (17.1)	87 (82.9)	95 (31.9)	18 (18.9)	77 (81.1)
Master's degree	12 (4)	3 (25)	9 (81.8)	6 (2)	0 (0)	6 (100)
Total	298 (100)	154 (51.5)	144 (48.5)	298 (100)	152 (51)	146 (48.7)

NC: Not accurate evaluation of a child's orthodontic treatment need; df: degree of freedom; C: Accurate evaluation of a child's orthodontic treatment need. Pearson's Chi-square test was used for comparisons with adequate expected cell counts; χ^2=18.42, df=4; Fisher's exact test was applied for education categories with small, expected frequencies <5. Effect size: Cramer's V. Father's education: p<0.001, Cramer's V=0.555. Mother's education: p<0.001, Cramer's V=0.515.

Table 4. A comparison of how accurately both parents assess their child's malocclusion

Parent	Total	NC	C	Significance
	n (%)	n (%)	n (%)	
Father	298 (50)	127 (42.7)	171 (57.3)	p=0.017
Mother	298 (50)	169 (56.8)	129 (43.2)	φ=0.138
Total	596 (100)	296 (51.3)	300 (48.7)	

NC: Not accurate evaluation of a child's orthodontic treatment need; df: degree of freedom; C: Accurate evaluation of a child's orthodontic treatment need. Pearson's chi-square test; χ^2=11.84, df=1. Effect size: Phi coefficient (φ=0.138). Significance: p=0.017 (p<0.05).

Table 5. Parental perception of their child's dental appearance in relation to prior awareness of orthodontic treatment

Have you heard of orthodontic treatment before?	Total	NC	C	Significance
	n (%)	n (%)	n (%)	
No	136 (45.6)	105 (77.2)	31 (22.8)	p<0.001
Yes	162 (54.4)	48 (29.6)	114 (70.4)	φ=0.474
Total	298 (100)	153 (51.3)	145 (48.7)	

NC: Not accurate evaluation of a child's orthodontic treatment need, df: degree of freedom; C: Accurate evaluation of a child's orthodontic treatment need. Pearson's Chi-square test; χ^2=66.99, df=1. Effect size: Phi coefficient (φ=0.474). χ^2 test result: p<0.001.

consistent with earlier studies in Turkey and internationally, although prevalence rates vary depending on diagnostic methods and sample characteristics.[13,14]

In several studies conducted in the same region as the present study, authors indicated a slight to no treatment need in similar age groups.[15,16] Consistent with the findings of the present study, a recent investigation also reported a statistically significant discrepancy between professional assessments and parental evaluations based on the DHC component of the IOTN.[17]

In a study demonstrating the relationship between classification of malocclusion and self-perception of the orthodontic treatment need, the IOTN-AC (self-perception) scores, in which children with Class II malocclusion evaluated their dental status according to their own esthetic perceptions, were found to be significantly higher.[18] Controversially, in the present study, the orthodontic treatment need scores for parents' assessments were significantly lower than the professional scores. Variations between the current findings and those reported in previous studies may stem from differences in participant demographics, including age and ethnic composition, indicating the need for additional investigations to examine these influences more comprehensively.

Parental awareness of orthodontic treatment needs was found to be insufficient, as more than half of the participants lacked knowledge of early intervention, and fewer than half correctly identified their child's malocclusion. This finding aligns with previous studies indicating that parents often underestimate orthodontic problems.[7,8]

Although the observed associations were statistically significant, the effect sizes indicated a moderate practical impact. These findings suggest that parental education level contributes meaningfully to awareness of orthodontic treatment needs, which may influence the timing of care-seeking behavior, even if it is not the sole determining factor.

Since parents are responsible for initiating treatment, a lack of awareness may lead to delays, which in turn increases treatment complexity. From the age of eight, parents should have their children examined for orthodontic n diagnosis every year to detect Class II malocclusions at early ages and start preventive or even orthopedic treatments to prevent more complex orthodontic and skeletal treatments in the future.

Parental education emerged as a significant factor influencing accuracy. Both fathers and mothers with higher education were more likely to correctly assess their child's dental appearance, in agreement with previous research linking socioeconomic status to health awareness.[9] Interestingly, fathers demonstrated higher accuracy overall, which may reflect gender differences in health literacy within the study population.

Another aim of the present study was to compare parental assessments with professional evaluations using the IOTN. This comparison was addressed through categorical association analyses based on IOTN-AC classifications, which quantified discrepancies between parental perception and professional assessment. While formal agreement statistics were not applied, the analyses clearly demonstrated limited concordance between parents and professionals.

These results highlight the need for community-based educational programs and school-based dental health initiatives to improve parental awareness. Earlier recognition of malocclusion can enhance treatment outcomes and reduce complexity and cost.[3,19]

Strengths of this study include its large sample size and use of validated indices. Although a priori sample size calculation was performed to ensure adequate statistical power, the use of convenience sampling from a single university clinic limits the generalizability of the findings. Therefore, caution is warranted when extrapolating the results to the general population. The cross-sectional design and reliance on parental self-report may also introduce bias. Future multicenter studies are recommended to confirm these findings and to evaluate how parental awareness influences actual treatment-seeking behavior and outcomes. Overall, the evidence supports the incorporation of both educational initiatives and clinical strategies to more effectively address orthodontic needs and enhance oral health outcomes within children and the wider community.

Conclusion

Class II malocclusion was the most prevalent type among children included in the study sample. Parental awareness of orthodontic treatment needs was insufficient, and higher education was associated with greater accuracy in perception. These findings emphasize the importance of parental education to promote early orthodontic evaluation and timely treatment.

Ethics Committee Approval: The Istanbul Yeni Yüzyıl University Ethics Committee granted approval for this study (date: 06.07.2021, number: 2021/07/-695).

Informed Consent: Written informed consent was provided by all parents.

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