

# Comparison of orthodontic treatment need by professionals and parents with different socio-demographic characteristics

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**SUMMARY** The aim of this study was to compare the socio-demographic features and self-perception of parents concerning the malocclusion of their children with the orthodontist's opinion of normative orthodontic treatment need. The parents of 208 children (101 girls and 107 boys, between 9 and 18 years: mean  $12.8 \pm 2.5$ ), who sought orthodontic treatment were asked to score the dental attractiveness of their children using the aesthetic component (AC) of the Index of Orthodontic Treatment Need (IOTN). These scores were then compared with those of the orthodontist, who also scored the Dental Health Component (DHC) of the IOTN. The influence of the socio-demographic features of the parents on both the orthodontist- and parent-rated IOTN scores was assessed. The AC grade of the IOTN and patient characteristics were tested with the Spearman's correlation coefficient ( $\rho$ ). The difference between the two dependent variables (orthodontists' and parents' AC grade) was compared using Wilcoxon's test.

A high need for orthodontic treatment was recorded in 74.0 per cent of the subjects. Although orthodontists rated 51.4 per cent of the patients as having a severe malocclusion on aesthetic grounds, only 33.6 per cent of parents rated their child malocclusion as severe. Although socio-demographic factors were not related to the parents' perception of malocclusion, they had an influence on orthodontic treatment need as assessed by the orthodontist. Parents, in this study population, rated their children's orthodontic treatment need less severely than the orthodontist regardless of their socio-demographic characteristics. Thus, orthodontists should involve parents in the orthodontic treatment decision-making process.

## Introduction

A malocclusion is considered as a deviation from the ideal occlusion, which may range from mild to considerable from the accepted norm. Hence, the level of treatment need varies widely. Measuring the prevalence of malocclusion and treatment need in a population is helpful for the planning of orthodontic services. Orthodontic indices are useful tools to determine individuals with treatment need and assign priority to those with the greatest need when orthodontic resources are limited. Patients' and their parents' perception of orthodontic treatment need should also be taken into account because knowledge concerning the attitudes of parents to the malocclusion of their children is becoming increasingly important in orthodontics: it is the parents who seek orthodontic treatment for improved aesthetics and function (Pietilä and Pietilä, 1994; Hamdan, 2004). Mandall *et al.* (1999) stated that a patient's desire for orthodontic treatment is not always influenced by their need for orthodontic treatment; thus, without a satisfactory estimate of the need and demand for treatment, it is difficult to develop and organize a meaningful service.

Self-perception of malocclusion and the uptake of orthodontic treatment have been studied for several populations (Pietilä and Pietilä, 1994; Mandall *et al.*, 1999;

Liepa *et al.*, 2003). The effects of gender, social class, age, and orthodontic treatment need on aesthetic self-perception have been investigated (Horowitz *et al.*, 1971; Mandall *et al.*, 1999; Abu Alhaija *et al.*, 2005). Some studies have evaluated parents' perceptions of orthodontic treatment need (Espeland *et al.*, 1992; Pietilä and Pietilä, 1994; Birkeland *et al.*, 1996) while others have used patients' perceptions (Burden and Pine, 1995; Mandall *et al.*, 1999; Abu Alhaija *et al.*, 2005). Espeland *et al.* (1992) evaluated patients' and parents' satisfaction with dental appearance and treatment need. When the orthodontic concern of the children was compared with that of their parents, it was found that parental dissatisfaction with their child's dental arrangement and the desire for treatment was greater than the child's own assessment (Birkeland *et al.*, 1996). As Lewit and Virolainen (1968) mentioned, parents make the final decision concerning treatment because the demand for orthodontic treatment primarily comes from the parents. Thus, the aim of the present study was to compare parents' perceptions of their children's malocclusion with clinician-measured normative orthodontic treatment need, using the socio-demographic status of the parents as a mediator as it is important to assess whether demand for treatment is uniform across socio-economic groups.

## Subjects and methods

After informing each participant about the purpose of the study, and where and how the results would be used, written consent was obtained.

In this cross-sectional study 208 (101 girls and 107 boys, between 9 and 18 years: mean  $12.8 \pm 2.5$ ) 'new' patients referred for orthodontic consultation to the Orthodontic Department of the State Dental Hospital in Turkey were examined. Patients attending with both parents were included in the study while those attending alone or with one parent were excluded. Patients whose parents had received orthodontic treatment were also excluded. In total, 152 subjects were excluded. The 208 patients were then divided into mixed (9–12 years) and permanent (13–18 years) dentition groups. The mixed dentition group included 108 patients (56 girls and 52 boys) and the permanent dentition group 100 patients (45 girls and 55 boys).

The monthly family income (very poor: 150–300 €/month; poor: 301–450 €/month; moderate: 451–600 €/month; high: 600–1500 €/month; or very high: more than 1501 €/month), social insurance (present or absent), parent's education (illiterate, primary school, high school, or university graduate), reason for seeking orthodontic treatment (aesthetic, functional, or both), and knowledge concerning what orthodontic treatment involved (present or absent) were also recorded (Table 1).

### Measurement of aesthetics

Orthodontic treatment need was determined using the Index of Orthodontic Treatment Need (IOTN). The IOTN is an internationally acknowledged scoring system for orthodontic treatment need as perceived by the professionals and patients. The IOTN incorporates both a Dental Health Component (DHC; Brook and Shaw, 1989) and an aesthetic component (AC; Evans and Shaw, 1987).

The DHC records various occlusal traits into five grades according to severity and the need for orthodontic treatment (Brook and Shaw, 1989). Grades 1 and 2 represent no/little need for treatment, grade 3 borderline, and grades 4 and 5 a definite need for orthodontic treatment. The DHC of the IOTN was evaluated by one author (AAD), an experienced orthodontist.

The AC has a scale of 10 colour photographs representing different levels of dental attractiveness, with grade 1 representing the most attractive and grade 10 the least attractive (Evans and Shaw, 1987). The AC was scored both by the patient's parents and by the orthodontist independently. The parents (in agreement with each other) were asked to make a judgement about how severe they considered their child's dental attractiveness.

For evaluation of the AC, the classification of Richmond *et al.* (1995) was used, where grades 1–4 represent no or little aesthetic need, grades 5–7 borderline aesthetic need, and grades 8–10 definite aesthetic need for orthodontic treatment.

**Table 1** Distribution of patients and socio-demographic characteristics.

Characteristics of the patients	N	%	Orthodontist		Parents	
			Median	Min–Max	Median	Min–Max
Gender						
Girls	101	48.6	6	1–10	4	1–10
Boys	107	51.4	8	1–10	6	1–10
Age, years						
9–12	108	51.9	8	1–10	6	1–10
13–18	100	48.1	8	1–10	5	1–10
Income (€/month)						
Very low (150–300)	69	33.2	8	1–10	6	1–10
Low (301–450)	71	34.1	7	1–10	5	1–10
Moderate (451–600)	38	18.3	7.5	1–10	5	1–10
High (>600)	30	14.4	5	1–10	5	1–10
Social insurance						
Present	189	90.9	7	1–10	5	1–10
Absent	19	9.1	8	1–10	7	1–10
Father's education						
Illiterate	3	1.4	10	9–10	6	5–10
Primary school	103	49.5	8	1–10	6	1–10
High school	57	27.4	7	1–10	5	1–10
University	45	21.6	5	2–10	4	1–10
Mother's education						
Illiterate	7	3.4	8	1–10	7	2–10
Primary school	128	61.5	8	1–10	6	1–10
High school	45	21.6	6	2–10	5	1–10
University	28	13.5	4	1–10	4	1–10
Reason for seeking treatment						
Aesthetic	170	81.7	7.5	1–10	5	1–10
Functional	14	6.7	8	1–10	7	1–10
Both	24	11.5	8	2–10	4	1–10
Knowledge of orthodontic treatment						
Present	123	59.1	8	1–10	5	1–10
Absent	85	40.9	6.5	1–10	5	1–10
Total	208	100.0	7	1–10	5	1–10

### Clinical examination

The clinical examinations were also undertaken by the same person who collected the data using the AC and DHC of the IOTN, blind to the demographic background of the patients. The AC scores were also completed by the patients.

### Reliability

To determine the method error, 55 subjects were re-examined 1 month after the initial examination. Kappa values for the DHC and the AC were 0.82 and 0.79, respectively.

### Statistical analyses

The results were expressed as frequencies for categorical findings. The association between the AC scores of the IOTN and the characteristics of the patients was tested with Spearman's correlation coefficient ( $\rho$ ). The difference

between the two dependent variables (orthodontist's versus parents' AC score) was compared using Wilcoxon's test. Data were analysed using the Statistical Package for Social Sciences Version 11 (SPSS Inc., Chicago, Illinois, USA) and significance levels were set at 0.05.

## Results

Table 1 shows the distribution of patients and the socio-demographic characteristics of their parent with the medians and minimum and maximum AC grade of IOTN for both the orthodontist's and parents' evaluations. The orthodontist's median treatment need score was higher than that of the parents (7 and 5, respectively).

The percentage distribution of the DHC of the IOTN of patients as scored by the orthodontist are shown in Figure 1. A definite need for orthodontic treatment (grades 4 and 5) was recorded in 74 per cent, borderline need (grade 3) in 13.9 per cent, and little need (DHC grades 1 and 2) in 12.1 per cent of subjects.

Figure 2 shows the distribution of AC grades for the orthodontist and parents. According to orthodontist's ratings, 51.4 per cent of the patients exhibited a severe aesthetic malocclusion (grades 8–10), whereas 18.3 per cent showed a borderline (grades 5–7), and 30.3 per cent little (grades 1–4) aesthetic need. In comparison, only 33.6 per cent of parents rated their children's malocclusion as severe, 23.6 per cent as borderline, and 43.8 per cent as normal or with a minimal aesthetic malocclusion.

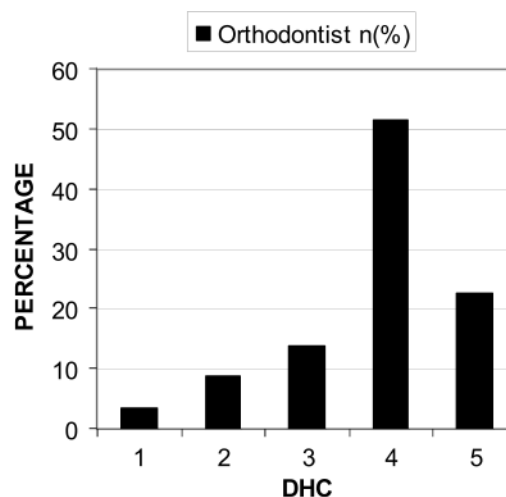
It is noteworthy that parents and the orthodontist perceived the oral status of 128 (62 per cent) patients identically. Of the 89 patients whose oral status were considered normal by the parents, 14 (6.7 per cent) were scored as borderline and 24 (11.5 per cent) as severe by the orthodontist. On the other hand, of the 63 patients regarded as normal by the orthodontist, seven (3.4 per cent) were perceived as borderline and five (2.4 per cent) as severe by the parents (Table 2).

The correlations between the patients' socio-demographic characteristics and IOTN scores are given in Table 3. For boys, both the orthodontist's and parents' AC grades were higher (i.e. greater treatment need;  $P < 0.01$  and  $P < 0.05$ , respectively). Family income was negatively correlated with orthodontist's AC grading ( $P < 0.01$ ). Patients with no social insurance had higher DHC and AC grades as scored by the orthodontist ( $P < 0.05$ ). As the education of the father increased, the DHC and AC grades of both the orthodontist and the parents decreased for all cases ( $P < 0.05$ ). Similarly, as the mother's education increased, the AC grades of the orthodontist decreased ( $P < 0.01$ ) but the parents' grades were unaffected. The reason (aesthetic or functional) for seeking orthodontic treatment and knowledge concerning the meaning of orthodontic treatment had no effect on the AC grades.

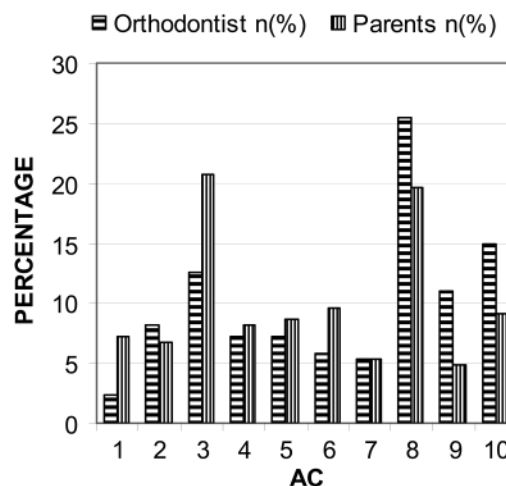
There was a significant correlation between DHC and the orthodontist-rated AC of the IOTN (Spearman's correlation coefficient, rho: 0.625,  $P < 0.001$ ).

## Discussion

The uptake of orthodontic treatment is influenced by the desire to look attractive, the self-perception of dental appearance, self-esteem, and peer group norms. In this study, the perception of malocclusion by both parents, in agreement, were evaluated. Because parents are in charge of their children's health, they were requested to evaluate their children's need for orthodontic treatment according to the AC of the IOTN. Their evaluations were compared with those of an orthodontist in order to define the relationship between their visual aesthetic understanding and that of the



**Figure 1** Percentage distribution of normative orthodontic treatment need: according to the Dental Health Component (DHC) of the Index of Orthodontic Treatment Need scored by the orthodontist. Grades 1 and 2: no/little need; grade 3: borderline need; grades 4 and 5: definite need.



**Figure 2** Percentage distribution of normative orthodontic treatment need according to the aesthetic component (AC) of the Index of Orthodontic Treatment Need. Grades 1–4: no/little aesthetic need; grades 5–7: borderline aesthetic need; grades 8–10: definite aesthetic need.

**Table 2** Evaluations by the parents and orthodontist of the aesthetic component (AC) of the Index of Orthodontic Treatment Need.

		Orthodontist, <i>n</i> (%)			
		Normal/little need (AC 1–4)	Borderline need (AC 5–7)	Severe need (AC 8–10)	Total
Parents, <i>n</i> (%)	Normal/little need (AC 1–4)	51 (24.5)	14 (6.7)	24 (11.5)	89 (42.7)
	Borderline need (AC 5–7)	7 (3.4)	18 (8.7)	24 (11.5)	49 (23.6)
	Severe need (AC 8–10)	5 (2.4)	6 (2.9)	59 (28.4)	70 (33.7)
Total, <i>n</i> (%)		63 (30.3)	38 (18.3)	107 (51.4)	208 (100.0)

**Table 3** Correlation between patients' socio-demographic characteristics and the Dental Health Component (DHC) and Aesthetic Component (AC) of the Index of Orthodontic Treatment Need scores.

	DHC	AC orthodontist	AC parents
Gender (girls: 0; boys: 1)	0.125	0.190**	0.152*
Dental status (9–12 years: 0; 13–18 years: 1)	0.113	0.002	–0.078
Income	–0.055	–0.191**	–0.107
Social insurance (absent: 0; present: 1)	–0.136*	–0.156*	–0.093
Father's education	–0.133*	–0.157*	–0.148*
Mother's education	–0.043	–0.202**	–0.127
Application reason (aesthetic or functional: 0, both: 1)	–0.034	0.026	0.046
Knowledge about orthodontics (present: 1; absent: 0)	0.047	–0.054	0.016

\* $P < 0.05$ , \*\* $P < 0.01$ , Spearman's correlation coefficient ( $\rho$ ).

orthodontist. The results showed that the parents were still less critical about their children's 'real' treatment need when compared with the orthodontist's evaluation.

Al-Sarheed *et al.* (2003) indicated that 18.7 per cent of 11–16 year old Saudi Arabian children had an objective need for orthodontic treatment. Several studies based on British populations found the need for treatment to be around 30 per cent (Holmes, 1992; Mandall *et al.*, 1999; O'Brien *et al.*, 2006), while in a Finnish population, 20 per cent of the subjects were classified in need of treatment based upon the DHC (Pietilä and Pietilä, 1996). The proportion of 11–16 year olds in need of orthodontic treatment in Nigeria was found to be 38.5 per cent (Otuyemi *et al.*, 1997). Fox *et al.* (1999) found a similar proportion (71 per cent) for those seeking orthodontic treatment, while in the present study, the result was 74 per cent.

According to the orthodontist's findings, 51.5 per cent of the patients had a severe aesthetic need, while 74.0 per cent had a definite orthodontic treatment need (Tables 2 and 3). The finding that the DHC of the IOTN was higher than the AC of the IOTN when recorded by the orthodontist is not surprising as orthodontic treatment need not only involves the AC but also the DHC. In addition, the results of this study showed that there was a significant correlation between DHC and the orthodontist-rated AC of the IOTN (Spearman's

correlation coefficient,  $\rho$ : 0.625,  $P < 0.001$ ). Contrary to the present findings, Roberts *et al.* (1989) found that perception of dental attractiveness and treatment need was similar. A probable reason may be the difference in the region studied by Roberts *et al.* (1989); i.e. North Derbyshire.

Vally (1997) found that orthodontists tend to recommend 10–12 per cent more treatment than laypersons. The present survey revealed that the orthodontist was more likely to rate the patient's AC of IOTN higher than the parents. Of the patients in the present study, 30.3 per cent had no or little aesthetic need according to both the orthodontist and parents, which is lower than that found by Hamdan (2004), Mandall *et al.* (1999), and Abu Alhaija *et al.* (2005). Furthermore, the severe aesthetic need ratio determined by the orthodontist and parents was greater than that in similar studies (Mandall *et al.*, 1999; Hamdan, 2004; Abu-Alhaija *et al.*, 2005). The reason for the increase in the patients with little or no aesthetic need and the decrease in AC in those with a severe need was probably due to sampling. The subjects were selected from individuals who applied to the state dental hospital for treatment and not randomly from the whole population.

Although no association was found between gender and DHC grades, the orthodontist-graded AC scales were higher for female patients. Furthermore, parents of female patients tended to rate their children's dentition towards the more attractive end of the AC scale. Abu Alhaija *et al.* (2005) reported similar findings while other authors found that parents perceived their daughters' dentition less attractive (Burden, 1995; O'Brien *et al.*, 1996; Mandall *et al.*, 1999). On the other hand, Burden *et al.* (2001) found that adolescents had similar perceptions of malocclusion irrespective of gender.

Abu Alhaija *et al.* (2005) reported that the availability of parents' social insurance had no effect on perceptions of their children's dentition, while Reichmuth *et al.* (2005) found that children rated themselves as having worse occlusions in publicly funded clinics. In the current study, socio-demographic features such as income and social insurance did not seem to affect the parents' perception of dental appearance. One exception was the father's education level. Parents perceived their children's occlusion more favourably as the education of the fathers increased. In contrast, the orthodontist scored the AC of



IOTN more severely in those who were less educated, had a lower income, and had no social insurance. In addition, DHC scores were negatively correlated with the fathers' education and social insurance. Education level, income, and social insurance were inter-related factors. The patient population with no social insurance used in this study was those who had a very low income and low education level. (It is noteworthy that patients with a high income but without social insurance were not encountered in this study, most probably due to their preference for private dental care). Individuals either with no income and health insurance or taxpayers with national health insurance can obtain free treatment from state hospitals. High-income patients also have access to private dental care as opposed to low-income patients who depend on national health insurance programmes. Therefore, it may be that more educated parents are more conscious about their children's dental health; attending dentists regularly for routine examination, benefiting from preventive treatment (fluoride applications and fissure sealants), and taking early precautions for their children's dental problems, which may result in a malocclusion. In addition, use of interceptive treatment modalities such as space retainers, springs, and removable appliances may have been used in this group of patients by general practitioners.

## Conclusions

Compared with the orthodontist's rating (51.4 per cent), parents (33.6 per cent) considered their children to have a lower aesthetic need. Patients and parents/guardians should be informed of the evidence base for orthodontic treatment, enabling a shared (patient/guardian/orthodontist) informed decision.

The education level of fathers influences the parental perception of the aesthetic need of their children. The orthodontist's rating for aesthetic need was inversely related to the patients' family income, social insurance, parents' education, and knowledge of orthodontics.

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