

# Perception of treatment need among orthodontic patients compared with professionals

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The aim was to evaluate estimated need for orthodontic treatment, as judged from intraoral photographs, among orthodontic patients and professionals. Twenty consecutive prospective orthodontic patients, 20 consecutive orthodontically treated patients, 10 randomized general dentists, and 10 orthodontists participated. Seventy pairs of anonymous intraoral photographs of dentitions with varying degrees of objective treatment need were randomly arranged in a notebook. The general dentists and orthodontists rated orthodontic treatment need on a visual analog scale in a similar way among themselves and were more reserved than both patient categories, who also scored similarly among themselves. Professional raters also had similar inter- and intra-rater reliability among themselves, and it was higher than in either of the patient categories. Treatment providers appear to be more restrictive, consistent, and reliable in their judgement of orthodontic treatment need from intraoral photographs than the target group, patients positive toward orthodontic treatment. □ *Epidemiology; malocclusions; reliability*

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The reasons and criteria for withholding or implementing orthodontic treatment are complex, and several decision-makers are involved. Demand by prospective patients for orthodontic treatment is based principally on actual dental irregularities (1, 2). However, physical dysfunction is not the only, and sometimes not even the patient's most important, motivation for orthodontic care (3). The demand for orthodontic treatment is not strongly correlated to clinical findings (4), and the correlation of desire and perceived need for braces is moderate, at least among third-grade schoolchildren (5). A considerable discrepancy in perceived treatment need between the patient and the orthodontist has been found in some studies (6, 7), but not all (8). Age- and sex-related differences in the demand for treatment exist, as do cross-cultural and socioeconomic differences (1, 9–12). An orthodontic treatment per se may also have an effect on attitudes toward orthodontic care (13). There is, accordingly, considerable interindividual variation in attitudes toward, and requests for, orthodontic treatment among potential patients, and those who actually desire treatment are therefore an important target population.

The Swedish National Board of Health and Welfare has issued an index for objective orthodontic treatment need (14), which together with the patient's opinion is sometimes used in Sweden to guide and assist the dentists in their considerations. This index, based on morphologic and functional criteria, comprises five categories numbered 0 to 4, with 4 indicating greatest treatment need. The public dental health system subsidizes all orthodontic care for children and adolescents in Sweden. The general dentists consult orthodontists, who supervise the use of removable as well as fixed appliances.

The decision to initiate orthodontic treatment concerns

both the referring and the treating dentists, as well as the potential patient. The perceived treatment need might thus involve many different elements and may vary among these categories (15). Delivery and standards of orthodontic care may change over time and vary in different societies. Knowledge of current treatment priorities and selection of motivated patients is important, particularly if available resources are limited. The purpose of the present study was therefore to examine how patients selected for treatment rate orthodontic treatment need in relation to professionals. Specifically, the main aim was to evaluate the agreement in need for orthodontic care, estimated from intraoral photographs, between and within the categories involved in the realization of such a decision: general dentists, orthodontists, and patients desiring treatment.

## Materials and methods

The orthodontic treatment need was evaluated by 4 different groups of participants. One category comprised 10 general dentists (5 men, 5 women), randomly selected from all 124 employed by the Bohus County Council, Sweden. All worked at least 50% with family dentistry, treating both adults and children. A second category was composed of 10 specialists in orthodontics (6 men, 4 women). At the time 6 were, and 4 had earlier been, employed full-time as orthodontic specialists by the same county. A third category comprised a consecutive series of 20 adolescents (10 males, 10 females; mean age, 14.5 years; range, 13–18 years) who were offered and desired orthodontic treatment, i.e. prospective patients. All had a dento-occlusal appearance of 2–4 and were about to start

Table 1. Means of visual analog scale (VAS) ratings in millimeters (0 indicating 'No orthodontic treatment need', 100 indicating 'Major orthodontic treatment need') in the 4 categories of raters for the total of 70 cases, the 30 pretreatment cases, and the group of 30 posttreatment and 10 'normal' cases. The means for the differences in ratings between the 30 pretreatment and 30 posttreatment cases are also shown. The same letters indicate no significant differences between categories in the same column

Category	Total ( <i>n</i> = 70)		Pretreatment ( <i>n</i> = 30)		Posttreatment ( <i>n</i> = 30) and 'normal' ( <i>n</i> = 10)		Difference pre- and posttreatment ( <i>n</i> = 30)	
	Mean VAS (mm)	Difference	Mean VAS (mm)	Difference	Mean VAS (mm)	Difference	Mean VAS (mm)	Difference
General dentists ( <i>n</i> = 10)	25.6	A	49.1	A	8.1	A	40.3	A
Orthodontists ( <i>n</i> = 10)	29.5	A	53.5	A, C	11.6	A	41.9	A
Prospective patients ( <i>n</i> = 20)	44.2	B	62.8	B, C	30.3	B	30.1	B
Treated patients ( <i>n</i> = 20)	44.6	B	67.1	B	27.7	B	37.0	A, B

treatment at the Orthodontic Specialist Clinic at Sahlgrenska University Hospital/Mölndal, Sweden. The fourth category was composed of another consecutive series of 20 adolescents (10 males, 10 females; mean age, 17.4 years; range, 14–22 years) who had completed orthodontic treatment at the same clinic, i.e. treated patients. They had all been treated owing to a dento-occlusal appearance of 2–4.

The above 60 participants evaluated the orthodontic treatment need from 77 pairs of intraoral color photographs (10 × 15 cm) of the dentition in intercuspal position, one frontal and one lateral. The dentition had been exposed with the help of lip-retractors. Thirty of the pairs of photographs reproduced the dento-occlusal appearances before treatment in cases with an orthodontic treatment need of 2–4, i.e. pretreatment cases. Another 30 pairs of photographs reproduced the dento-occlusal appearances in the same cases after completed orthodontic treatment, i.e. posttreatment cases. Ten pairs of photographs reproduced the dento-occlusal appearances in untreated cases with a treatment need of 0–1, i.e. 'normal' cases. A final 7 pairs of photographs were duplicates, randomly selected from the 70 pairs above (10%) and added to allow the evaluation of the reliability of the ratings.

The 77 pairs of photographs, showing varying dento-occlusal appearances of patients of different ages and both sexes, were randomly arranged in a notebook with each pair on a separate page. A visual analog scale (VAS) was placed on the page facing each pair of photographs. The first pages of the notebook contained instructions written in simple terms. The participants were requested to independently evaluate how they perceived the orthodontic treatment need from the photographs ('rate the orthodontic treatment need, as you understand from the photos, for each case by putting a cross on the line'), and not to look back in the notebook for comparisons. The instructions were followed by three extra cases, previously rated for illustration. Thereafter, the participants rated the treatment need for each case on a 100-mm VAS. The left endpoint (0 mm) indicated 'No orthodontic treatment need'; the right (100 mm), 'Major orthodontic treatment need'. No information about the origin of the photo-

graphs, other participants' ratings, or the ultimate purpose of the research was provided.

The notebook was mailed to the dentists and orthodontists; the patients made their ratings during visits to the clinic. The procedure took about 20 min. All subjects who were asked agreed to participate.

#### Statistical methods

Duncan's multiple range test was used to test for differences between means in the ratings (16). Intraclass correlation coefficients (ICCs) were used to measure consistency and reliability within raters on the continuous scales (17). Tests of differences between independent correlations were also performed (18). A difference was considered statistically significant at  $P < 0.05$  or better.

#### Results

The mean VAS ratings of 'orthodontic treatment need' of the 70 cases (no duplicates) in the 4 different categories of raters are shown in Table 1. The means of the ratings in both the subgroup of the 30 pretreatment cases and the subgroup of the 30 posttreatment and 10 'normal' cases are shown. The means of the differences between the ratings of the pre- and posttreatment photographs of the 30 cases are also shown in Table 1. Significant differences in ratings between categories can be seen. There was no significant difference in any ratings between male and female participants in any of the categories.

ICCs were calculated to measure the consistency of the ratings of 'orthodontic treatment need' between the raters within each category for all 70 cases, for the 30 pretreatment cases, and for the 30 posttreatment and 10 'normal' cases. These are shown in Table 2. Consistency between raters for the differences in ratings between the 30 pretreatment and 30 posttreatment cases are also shown in Table 2. Significant differences in consistency between categories were found.

Reliability in the ratings of 'orthodontic treatment need' was estimated within each category of raters for the seven randomized cases and their duplicates and calculated as ICCs between the ratings. The means of the VAS ratings

Table 2. Consistency, measured by intraclass correlations (ICCs), in the ratings of 'orthodontic treatment need' in the 4 categories of raters for the total of 70 cases, the 30 pretreatment cases, and the group of 30 posttreatment and 10 'normal' cases. Consistency of the differences in ratings between the 30 pretreatment and 30 posttreatment cases is also shown. The same letters indicate no significant differences between categories in the same column

Category	Total ( <i>n</i> = 70)		Pretreatment ( <i>n</i> = 30)		Posttreatment ( <i>n</i> = 30) and 'normal' ( <i>n</i> = 10)		Difference, pre- and posttreatment ( <i>n</i> = 30)	
	ICC	Difference	ICC	Difference	ICC	Difference	ICC	Difference
General dentists ( <i>n</i> = 10)	0.72	A	0.52	A, C	0.19	A	0.46	A
Orthodontists ( <i>n</i> = 10)	0.77	A	0.55	A	0.16	A	0.44	A
Prospective patients ( <i>n</i> = 20)	0.47	B	0.36	B	0.16	A	0.25	B
Treated patients ( <i>n</i> = 20)	0.57	B	0.43	B, C	0.16	A	0.28	B

of 'orthodontic treatment need' for the randomized cases differed significantly between the categories in the same way as the means for the 70 ratings. The reliability (ICC) was 0.71 for the general dentists, 0.68 for the orthodontists, 0.42 for the prospective patients, and 0.54 for the treated patients. The two professional groups did not differ in reliability, and neither did the two lay groups. Both professional groups were significantly more reliable than either of the lay groups.

## Discussion

The professional raters were chosen as representative of their occupational branches. The patients constituted subjects favorably disposed toward treatment and were thus an intentionally skewed population; only a certain fraction of the population demand orthodontic treatment and would therefore be important in this context. These patients were thus considered the relevant target group, in the light of the elective nature of orthodontic treatment. The patients' ratings are a general, not a personal, estimate of orthodontic treatment need and were unaffected by pressure from parents. Also, no information about the meaning or consequences of treatment or no treatment in the exhibited cases was provided.

Intraoral photographs were used to estimate 'need for orthodontic treatment', since this method is intelligible also to laypersons and allows for standardized comparisons among groups. These stimuli may generate valid and reliable ratings (19), although less comprehensively than normal clinical and X-ray examinations. All dento-occlusal appearances, that is, 0–4, were included in the series.

The hesitancy to start orthodontic treatment might vary even if a final decision always must be dichotomous in individual cases. The VAS was therefore chosen to give a more balanced, but epitomized, position of the opinions. The participants' considerations could reflect, among other things, concern for function, prevention of tissue destruction, prognosis, appearance, and psychosocial or economic aspects of orthodontics to varying degrees in the different categories (20).

It can be established that both patient categories rated orthodontic treatment need as significantly greater than both professional categories for all exhibited cases, pre-

and posttreatment as well as 'normal'. That the two professional and the two lay categories scored similarly between themselves—in line with previous findings (15)—also suggests that a real difference of opinion exists between the participating groups. Compared with professionals, patients positive toward orthodontic care thus appear to rate treatment need as very high. A difference in the opposite direction has earlier been found in ratings of the severity of children's own malocclusions (21) and when lay observers' estimates were compared with those of orthodontists and dentists (15, 22). Our lay raters were selected for their positive attitude toward orthodontic treatment and thus constitute dentally concerned individuals, unrepresentative of the general population. We believe that this fact is decisive and the most obvious explanation for the difference in results.

The similarity in the ratings of treatment need between males and females, particularly among the prospective and treated patients, may appear to be an unexpected finding, since previous research has indicated that orthodontic treatment demand is higher in females (1, 10, 11, 13, 23). The ratings of treatment need and demand, however, have most often been of the respondents' own dental appearance and not those of anonymous cases. A genuine gender difference in opinions of treatment need may not exist, but females may be more critical of their own appearance (1).

Mohlin (13) found differences in occlusal self-awareness between orthodontically untreated and treated subjects, but this was not confirmed by Espeland & Stenvik (24). The findings in the present study indicate that the participants perceived changes brought about by orthodontic treatment differently. Prospective patients seem to be less observant than the participants in the other categories: the difference in the treatment need estimated by the prospective patients between the pre- and posttreatment photographs of the 30 cases was smaller than that estimated by the participants in any of the other categories. That the treated patients detected larger differences that were closer to the estimations made by the professionals might be interpreted as a sign of an increased awareness of dental-related variables. The differences in age might also be of importance.

An acceptable level of consistency, above 0.75 (25), in the ratings of the 70 cases was found only among the

orthodontists, but the consistency among general dentists was only slightly lower. These facts are encouraging, since no inter-rater or other coordination training took place. However, the three previously rated cases used as illustrations might have had a certain harmonizing effect on the raters. It has earlier been observed that dentists can disagree in their judgement of orthodontic treatment need (26, 27). The consistency in the evaluations of the 30 pretreatment cases by all categories was lower than in the ratings of all 70 cases and unacceptable (25), although consistency among the professionals was better than among the laypersons. Shorter series of observations are in principle less reliable (28). That the consistency in the ratings was lower among the patients than the dentists—most often significantly so—quite likely reflects the difference in professionalism and was therefore predictable and in line with previous results (15). In evaluations of posttreatment and 'normal' cases, the consistency was equally low among all categories. It thus appears, not unexpectedly, to be easier to achieve agreement in cases with objectively greater treatment need (Board index, 2–4) than in those with less (0–1).

Differences among categories were found also for intra-rater reliability. Patients estimated treatment need less reliably than professionals—which is also in line with earlier findings (21)—and for the same probable reasons as for the differences in consistency. In judgements of the seven randomized cases and their duplicates on the continuous scales, none of the categories were acceptably reliable (25), although the reliability of the professionals was almost acceptable.

In conclusion, general dentists and orthodontists rated orthodontic treatment need from intraoral photographs in a similar way and were more reserved than the target group, patients positive toward orthodontic treatment. The orthodontic care system seems to have succeeded in selecting patients motivated for treatment, since the patients rated treatment need comparatively highly. Treatment providers appear to be more restrictive in the decisions to start treatment. Professional raters of orthodontic treatment need seem to be more consistent and more sensitive to changes brought about by orthodontic treatment. Their ratings also appear to be more reliable.

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