

Lay attitudes to dental appearance and need for orthodontic treatment

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SUMMARY In provision of advice about aesthetic treatment need, visual stimuli as a tool in communication may have some advantages compared with verbal descriptions, in particular when children are addressed. The Aesthetic Component (AC) of the Index of Orthodontic Treatment Need is an illustrated scale for rating of dental attractiveness developed in the UK and based on lay adults' ratings of dental photographs. This scale has also been recommended for use in patient education. The purpose of the present study was to establish a sociocultural standard of reference for Norway related to the AC, in order to examine the applicability of the scale as a tool in patient information.

Samples of 137 children, 126 of their parents and 98 young adults were shown the 10 photographs comprising the AC. The subjects were asked to assess the photographs for dental attractiveness and orthodontic treatment need on a four-category rating scale. The findings indicated that, in general, photographs with an increasing scale point were rated as increasingly more unattractive. The majority (80–100 per cent) of the parents and young adults rated the five photographs on the unattractive end of the scale to be in need of treatment. The children were significantly less critical in their aesthetic judgements.

Photographs representing borderline need, identified for these groups to be scale points 5 and 6, have a potential in guiding patients and parents in making informed decisions about aesthetic treatment need.

Introduction

Informed consent to treatment implies a process in which the potential patient is provided with adequate information about treatment need and treatment alternatives sufficient for the individual to make an independent decision about treatment (Nash, 1988). Careful handling of this process to assure patient autonomy is particularly important in orthodontics as treatment often is elective to a greater extent than other health services. Psychosocial aspects of need also play a major role (McLain and Proffit, 1985). Treatment decisions are particularly challenging when the malocclusion represents a borderline need consisting mainly of aesthetic improvement (Shaw *et al.*, 1991).

When dealing with information related to morphology and the aesthetic significance of variability, visual stimuli as tools in communication may be more comprehensible than verbal descriptions. This may particularly hold true

when children are addressed because their level of cognitive development may vary. It has been shown that standardized dental photographs can be used as a valid representation of dental attractiveness (Howells and Shaw, 1985).

The Aesthetic Component (AC) of the Index of Orthodontic Treatment Need is a rating scale for dental attractiveness comprising 10 numbered dental photographs (Evans and Shaw, 1987; Brook and Shaw, 1989) (Fig. 1). The scale has been developed in the UK and is designed to measure the aesthetic impairment of malocclusion, and hence the psychosocial need for orthodontic treatment. The child's dental appearance is supposed to be assessed relative to the scale on the basis of comparison to dental attractiveness depicted by the photographs, rather than specific morphological similarity.

The AC scale was constructed by using dental frontal view photographs of 1000 12-year-olds which were rated by six lay judges for attractiveness on a visual analogue scale. At

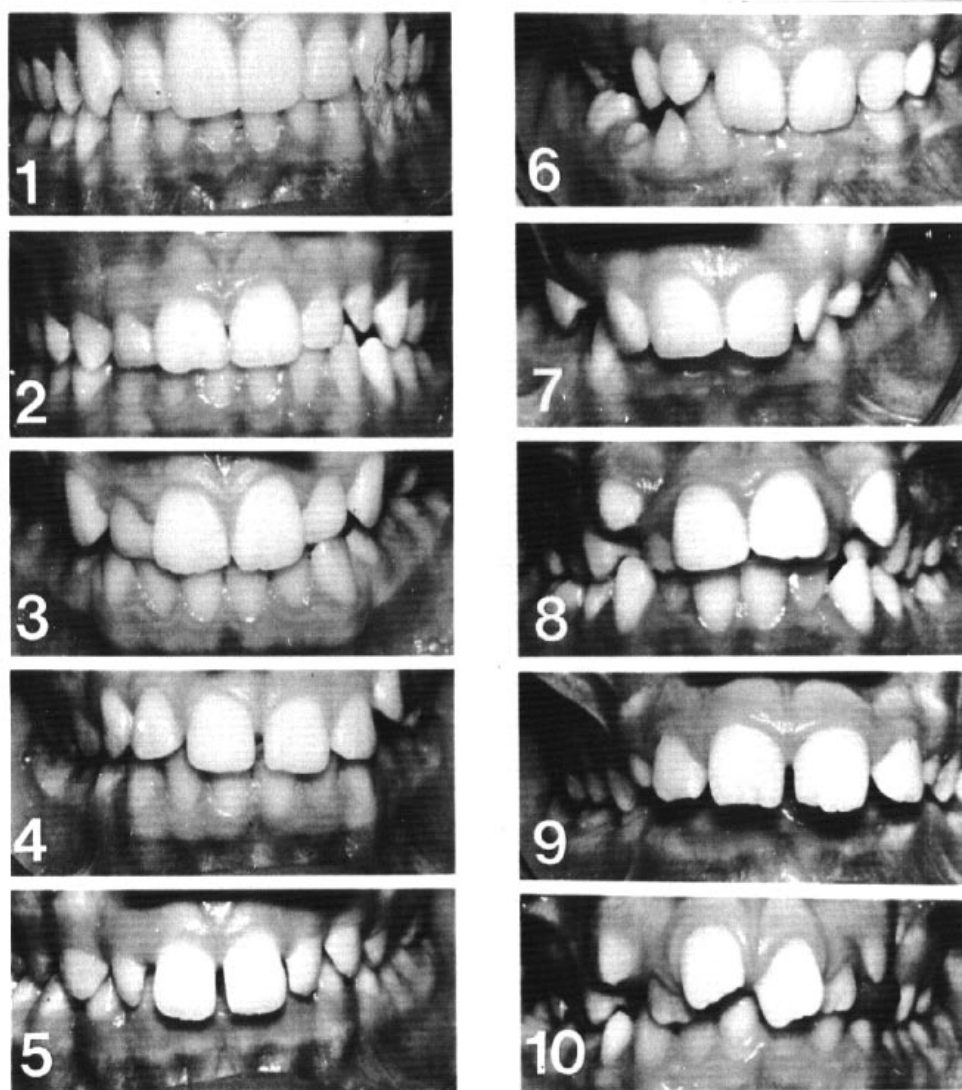


Figure 1 The Aesthetic Component of the Index of Orthodontic Treatment Need (Brook and Shaw 1989, published with the kind permission of the authors).

equidistant intervals along the judged range, a subsample of 10 photographs were chosen to provide illustrations for a 10-point scale, representing a wide variation in dental attractiveness. Accordingly, the scale may be regarded as continuous, where scale point 1 represents the most and 10 the least attractive arrangement of teeth.

In a validation study, the photographs were re-categorized to reflect current British

professional opinion about aesthetic treatment need (Richmond, 1990). The grades are: 'no need for treatment' (scale points 1 and 2), 'slight need for treatment' (scale points 3 and 4), 'moderate/borderline need for treatment' (scale points 5, 6 and 7) and 'great need for treatment' (scale points 8, 9 and 10). The proposed applications of the AC are both to assist the orthodontist in determining treatment priority and in research related to psychosocial aspects of malocclusion.

Furthermore, by allowing potential patients to place themselves on the scale, it has been proposed to use the AC as a tool in patient counselling when assisting subjects to gain a realistic impression of their relative dental attractiveness (Shaw *et al.*, 1991).

As cultural norms for acceptable dental arrangement may differ between countries, gradings of attractiveness and cut-off points for treatment need probably also vary. Furthermore, information to lay persons about standards for appearance would represent a societal perspective when based on data from cross-sectional studies on lay persons' opinions. The purpose of the present study was to establish a sociocultural standard of reference related to the AC scale. Such standards may be utilized in patient education and information, and may assist potential orthodontic patients in making informed decisions about treatment need.

Subjects and methods

Subjects

The material consisted of three samples comprising 137 children, 126 of their accompanying parents and 98 young adults. Data for the samples of children and parents were collected by consecutively interviewing subjects referred for orthodontic consultation in a private practice in Skien, Norway. In this district all the children are screened in the Public Health Service by general dentists, and when treatment is indicated, referred for orthodontic consultation. All the children between 8 and 16 years and their accompanying parents attending one orthodontic clinic were asked to participate. Of 157 family units attending the clinic two refused to participate, and in 18 the children were outside the age-range defined. The mean age of the remaining 137 children (77 females and 60 males) was 11.6 years (SD 1.9 years). Since eight of the parents accompanied two siblings and one parent brought four, 126 parents (102 mothers, 24 fathers) attended.

The sample of young adults (age 20 years) was selected with assistance from the National Central Personal Register in connection with a

Table 1 Alternative statements (A–D) translated from Norwegian for a four-category characterization of the 10 photographs representing the scale points on the AC (Fig. 1) presented to 137 children, 126 parents and 98 young adults.

A	The tooth position is <i>very good</i> , I think it is among the nicest
B	The tooth position is not among the nicest, but quite <i>acceptable</i>
C	The teeth do <i>not look very good</i> , but they do not need to be corrected
D	The teeth are so <i>unattractive</i> that they <i>need to be corrected</i>

follow-up survey on orthodontic treatment need. All individuals (322) born in 1973 living in four communes in Finnmark, Norway, were invited by letter to attend a clinical examination and an interview. Of 98 individuals who responded, 65 were females and 33 were males. Most of the non-respondents had temporarily moved from the area due to education or military service.

Methods

All the participants were shown the panel of 10 dental photographs representing the scale points on the AC (Figure 1). The subjects were requested to evaluate each of the 10 dentitions on a four-category rating scale consisting of ordered alternative characterizations (A–D) which indicated different levels of aesthetic appearance ('very good', 'acceptable', 'not good' and 'unattractive') (Table 1). The characterizations were supplemented by a statement about whether treatment was needed, and only in category D ('unattractive') did appearance qualify for treatment.

For each subject a cut-off point on the AC scale was determined by the photograph judged to be in need of treatment (category D) having the lowest value. To analyse whether the subject perceived the AC scale as progressive, the photographs with AC values above the cut-off point were examined for their scores on the four-category rating scale. Discontinuity was recorded if one or more photographs above the cut-off point were judged to represent no need for treatment (categories A, B and C).

Mean cut-off points were calculated for the

groups of children, parents and young adults. Differences in mean cut-off points between groups were examined by analysis of variance. The kappa coefficient of agreement (Cohen, 1960) was used to analyse agreement within the child, parent and young adult groups. For assessment of agreement between each child and his or her parent, the weighted kappa (Cohen, 1968) was used.

Results

The relative distribution of subjects' judgements of the photo-scale according to the four-category ratings is illustrated in Figure 2 for the various groups. Figure 3 illustrates the relative frequency of subjects in the three groups judging each of the dentitions on the AC scale to be in need of treatment (category D). Figures 2 and 3 confirm that on a group basis the AC scale is progressive, thus indicating increasing levels of unattractiveness. The only exception is photograph 9.

The young adults and the parents rated the photographs in a similar manner, whereas the children were somewhat less critical in their aesthetic judgements. The dentitions representing the four scale points at the attractive end of the scale were considered to need treatment by less than 25 per cent of all three samples. More than 90 per cent of the parents and young adults judged the dentitions representing AC scale points 7 and above to be in need of treatment. The greatest variability in judgement of need was observed for photographs 5 and 6. Although assessed by more than 70 per cent of the parents and young adults to represent a treatment need, only about 50 per cent of the children rated these dentitions so unattractive that they needed treatment.

No significant differences in mean cut-off point existed between the sexes in either group, or between parents of girls and boys. Table 2 reveals that the mean cut-off point for the children was significantly higher than for the parents ($F = 5.87$, $P < 0.05$) and the young adults ($F = 7.73$, $P < 0.01$). The children accordingly had a higher threshold for judgement of aesthetic need than the other samples.

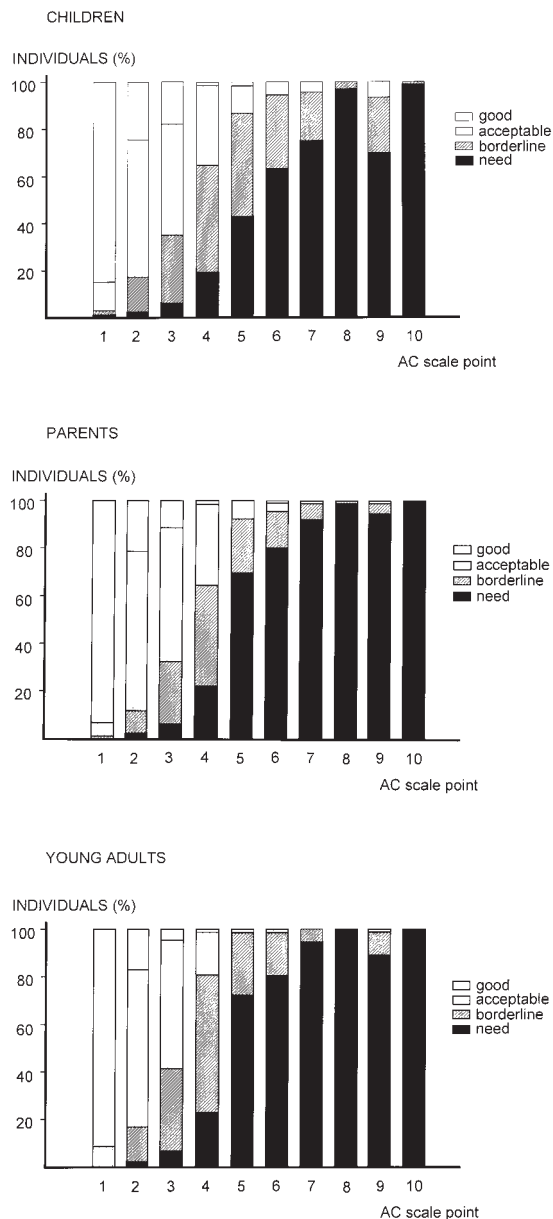


Figure 2 Relative distribution of subjects' ratings of the 10 photographs representing the scale points on the AC (Figure 1). Ratings were given according to a four-category characterization (Table 1) by 137 children, 126 parents, and 98 young adults.

Agreement within the three groups is shown in Table 3. The kappa coefficients of agreement for the extreme characterizations 'very good' and

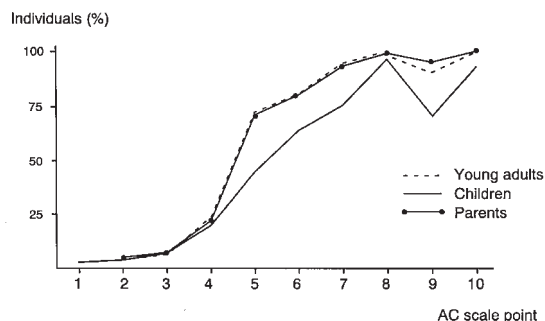


Figure 3 Relative frequency of subjects judging each of the 10 photographs representing the scale points on the AC, to be in need of treatment (category D, Table 1) assessed among 137 children, 126 parents, and 98 young adults.

Table 2 Mean cut-off points defining need for treatment based on ratings of the 10 photographs representing the scale points of the AC.

	Cut-off point defining need		Frequency of subjects	
	<i>x</i>	SD	Progressive ratings <i>n</i> (%)	Divergent ratings by more than one category <i>n</i> (%)
Children (<i>n</i> = 136*)	5.6	1.5	79 (58)	12 (9)
Parents (<i>n</i> = 126)	5.2	1.3	109 (87)	3 (2)
Young adults (<i>n</i> = 98)	5.1	1.1	79 (81)	2 (2)

Ratings were made by children, their parents and young adults according to a four-category rating (see Table 1). The frequency of subjects whose ratings were progressive throughout the AC scale and the frequency of subjects whose ratings diverged by more than one category subsequent to identifying the scale point representing need are also given.

By analysis of variance (one-way ANOVA) there was a significant difference between children and parents ($F = 5.87$, $P < 0.05$) and between children and young adults ($F = 7.73$, $P < 0.01$).

'unattractive' are interpreted to represent substantial agreement beyond chance for the adult groups (Landis and Koch, 1977). For

Table 3 Agreement within groups of 137 children, 126 parents and 98 young adults on ratings of the 10 photographs representing the scale points on the AC, using a four-category rating (see Table 1).

Category of rating	Kappa coefficient of agreement		
	Children	Parents	Young adults
'Very good'	0.56	0.67	0.72
'Acceptable'	0.26	0.40	0.42
'Not very good'	0.13	0.14	0.21
'Unattractive, needs to be corrected'	0.53	0.70	0.69

Table 4 Distribution of weighted kappa level of agreement between each child and his or her parent (137 pairs) on ratings of the 10 photographs representing the scale points on the AC.

Weighted kappa	Label	Frequency of child-parent comparisons	
		<i>n</i>	%
0.00–0.20	slight	6	4
0.21–0.40	fair	16	12
0.41–0.60	moderate	34	25
0.61–0.80	substantial	50	37
0.81–1.00	perfect	31	23
Total		137	101

The interpretation of kappa (strength of agreement) was according to the guidelines by Landis and Koch (1977).

agreement between each child and his or her parent the overall weighted kappa was 0.55, which indicates moderate agreement. The distribution of relative frequencies of the 137 child-parent comparisons is shown Table 4.

Discussion

Previous studies have applied visual stimuli to compare professional and lay judgements of dentofacial appearance (Shaw *et al.*, 1975; Prahl-Andersen *et al.*, 1979; Jenny *et al.*, 1980, 1983; Tedesco *et al.*, 1983a), or to examine cultural differences in acceptability of dental

aesthetics (Cons *et al.*, 1983, 1986; Tedesco *et al.*, 1983b).

The AC of the Index of Orthodontic Treatment Need has been established through a comprehensive process involving lay judgements, and has been validated for determining treatment need according to British professional opinion. The ranking of photographs as increasingly more unattractive has been confirmed in the present study. The index has previously been applied both in studies of need and outcome of treatment (Holmes, 1992; Richmond and Andrews, 1993; Richmond *et al.*, 1993). As the purpose of the present study was to establish a sociocultural standard of reference related to the AC scale, the scale was presented to the respondents in the original form. Presentation of the individual photographs in random order may have affected the ratings, but this was outside the scope of this study.

As health professionals are recommended or required to assure patient autonomy, the present study was undertaken in an attempt to establish premises for the potential use of an already documented Aesthetic Index in the information of candidates for orthodontic treatment. Children referred for orthodontic treatment were therefore the primary target population, but their parents and young adults were also included to represent a broader societal perception. The cut-off points for aesthetic treatment need representative for groups of Norwegian lay persons did not differ in any substantial way from British professional opinion (Richmond, 1990). Scale points 1–4 were confirmed to represent acceptable appearance with no need for treatment, whereas the majority judged scale points 7–10 as representing treatment need. This finding can form the basis for advice from the orthodontist to refrain from or embark upon treatment to patients with appearance comparable to these scale points, respectively.

The decision to treat or not depends on many factors in addition to appearance (i.e. health risks, motivation, costs, duration, prognosis), and can therefore not be made solely on the basis of indices of treatment need. For patients scoring at the extreme ends of the aesthetic scale,

other indicators often will be in harmony with the aesthetic scores.

The most difficult decisions about treatment are those that have to be made for borderline malocclusions with aesthetic implications. For some patients and parents in this category information about societal norms for acceptable appearance may prove useful. For the investigated groups the most important information seems to be that adults have a more critical attitude to acceptable appearance than children, and that scale points 5 and 6 may be said to represent borderline need as they are regarded as unacceptable by 50 per cent of children referred for orthodontic treatment and 75 per cent of adults.

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References

- Brook P H, Shaw W C 1989 The development of an index of orthodontic treatment priority. *European Journal of Orthodontics* 11: 309–320
- Cohen J 1960 A coefficient of agreement for nominal scales. *Educational Psychological Measurement* 20: 37–46
- Cohen J 1968 Weighted kappa: nominal scale agreement with provision for rescaled disagreement and partial credit. *Psychological Bulletin* 70: 213–220
- Cons N C, Jenny J, Kohout F J, Freer T J, Eismann D 1983 Perceptions of occlusal conditions in Australia, the German Democratic Republic and the United States of America. *International Dental Journal* 33: 200–206
- Cons N C, Jenny J, Kohout F J 1986 DAI: the Dental Aesthetic Index. University of Iowa, Iowa City
- Evans R, Shaw W 1987 Preliminary evaluation of an illustrated scale for rating dental attractiveness. *European Journal of Orthodontics* 9: 314–318
- Holmes A 1992 The subjective need and demand for orthodontic treatment. *British Journal of Orthodontics* 19: 287–297
- Howells D J, Shaw W C 1985 The validity and reliability of ratings of dental and facial attractiveness for epidemiologic use. *American Journal of Orthodontics* 88: 402–408
- Jenny J, Cons N C, Kohout F J, Frazier P J 1980 Test of a method to determine socially acceptable occlusal

- conditions. *Community Dentistry and Oral Epidemiology* 8: 424–433
- Jenny J, Cons N C, Kohout F J 1983 Comparison of SASOC, a measure of dental aesthetics, with three orthodontic indices and orthodontist judgment. *Community Dentistry and Oral Epidemiology* 11: 236–41
- Landis J R, Koch G G 1977 The measurement of observer agreement for categorical data. *Biometrics* 33: 159–174
- McLain J B, Proffit W R 1985 Oral health status in the United States: prevalence of malocclusion. *Journal of Dental Education* 49: 386–396
- Nash D A 1988 Professional ethics and esthetic dentistry. *Journal of the American Dental Association*, Special Issue 7-E
- Prahl-Andersen B, Boersma H, van der Linden F P G M, Moore A W 1979 Perceptions of dentofacial morphology by laypersons, general dentists, and orthodontists. *Journal of the American Dental Association* 98: 209–212
- Richmond S 1990 A critical evaluation of orthodontic treatment in the General Dental Services of England and Wales. PhD Thesis, University of Manchester
- Richmond S, Andrews M 1993 Orthodontic treatment standards in Norway. *European Journal of Orthodontics* 15: 7–15
- Richmond S, Shaw W C, Stephens S D Webb W G, Roberts C T, Andrews M 1993 Orthodontics in the General Dental Service of England and Wales: a critical assessment of standards. *British Dental Journal* 174: 315–329
- Shaw W C, Lewis H G, Robertson N R E 1975 Perception of malocclusion. *British Dental Journal* 138: 211–216
- Shaw W C, Richmond S, O'Brien K D, Brook P, Stephens S D 1991 Quality control in orthodontics: indices of treatment need and treatment standards. *British Dental Journal* 170: 107–112
- Tedesco L A, Albino J E, Cunat J J, Green L J, Lewis E A, Slakter M J 1983a A dental–facial attractiveness scale. Part I. Reliability and validity. *American Journal of Orthodontics* 83: 38–43
- Tedesco L A, Albino J A, Cunat J J, Slakter M J, Waitz K J 1983b A dental–facial attractiveness scale. Part II. Consistency of perception. *American Journal of Orthodontics* 83: 44–46