Original Article

Perceptions of dental aesthetics of Class III and anterior open bite malocclusions

A comparison between 10- to 11-year-old schoolchildren and orthodontists

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ABSTRACT

Objective: To compare perceptions of dental aesthetics of Class III and anterior open bite (AOB) malocclusions between 10- to 11-year-old Birmingham schoolchildren and orthodontists.

Materials and Methods: Thirty-one orthodontists practicing in Birmingham (UK) and 383 school children aged 10–11 years from a random and representative sample of seven primary schools in South Birmingham participated in the study. Participants were asked to assess five anterior photographs of the dentition representing varying degrees of aesthetic impairment of Class III and AOB malocclusions. Perceptions of dental aesthetics were determined using the aesthetic component (AC) of the Index of Orthodontic Treatment Need (IOTN).

Results: Perceptions of dental aesthetics were similar among males and females ($P > .05$). Both groups allocated the highest median AC score to the photo representing severe Class III malocclusion and the lowest to the photo representing mild Class III and AOB malocclusion. Differences in perceived dental aesthetics were significant for photos representing severe Class III and moderate AOB malocclusions, with orthodontists perceiving greater aesthetic impairment for severe Class III and schoolchildren for moderate AOB, respectively ($P < .05$).

Conclusions: Schoolchildren and orthodontists perceived Class III malocclusions to have greater aesthetic impairment compared to AOB malocclusions. Surprisingly, none of the median AC scores allocated to the five photos were in the ''Definite need'' for treatment category. The IOTN may not be sensitive to these types of malocclusions. This finding merits further investigation. (*Angle Orthod.* 2012;82:202–208.)

KEY WORDS: Aesthetics; Treatment need; Class III; Anterior open bite

INTRODUCTION

Aesthetics are an important factor for patients seeking orthodontic treatment.[1–7] The expectation of orthodontic treatment has been shown to depend on patients' perceptions of their own dento-facial aesthetics.[5] Patients' perceptions of orthodontic treatment cannot be underestimated, as it is the patients who receive treatment and need to gain satisfaction from improved aesthetics and function.[8]

Assessments of dental aesthetics are complex, subjective, and vary greatly between individuals.[9–11] What is an acceptable dental appearance for one person may not be acceptable for another. Objective measures for dental aesthetics have been developed in an attempt to overcome these problems.[2,12–15]

The Index of Orthodontic Treatment Need (IOTN) is a method for defining the severity of occlusal traits that may constitute a threat to the longevity of the dentition. Traits are allocated into grades, which define the priority of treatment need. The index incorporates both a dental health component (DHC)[2] and an aesthetic component (AC).[14] Details of the

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DHC and representative photographs of the AC are illustrated in the original paper by Brook and Shaw.[2]

Class III and anterior open bite (AOB) malocclusions are arguably among the most challenging cases for orthodontists to treat. They pose a significant aesthetic impairment for patients,[7] and psychological impairment and functional problems have been reported in association with these malocclusions.[16,17] It is, therefore, surprising that Class III and AOB malocclusions are not represented in current aesthetic occlusal indices.

Aims and Objectives

The aims of the present study were to assess and compare the perceptions of dental aesthetics of Class III and AOB malocclusions by 10- to 11-year-old Birmingham schoolchildren and orthodontists using the AC of IOTN.

Null Hypothesis

There is no difference between 10- to 11-year-old Birmingham schoolchildren and orthodontists in the perceptions of dental aesthetics of Class III and AOB malocclusions.

MATERIALS AND METHODS

Sample Selection—Schoolchildren

Ethical approval was obtained from the East Birmingham Local Research Ethics Committee prior to data collection. The local education authority was contacted to obtain basic epidemiological data needed for sample selection. There were 82 primary schools in South Birmingham and Year 6 was selected to best represent the 10- to 11-year-old age group required for the present study. This age range was selected because previous research into decision making suggested that children below the age of 10 years have difficulty in making decisions on aesthetic improvement.[18] Furthermore, participants in the present study were at an age that they were unlikely to have experienced orthodontic treatment. The total number of school children attending Year 6 classes in South Birmingham was 3691. For the purposes of the present study, a sample size of around 10% was considered to be representative of this target population.

The local education authority also provided a booklet entitled ''Starting Your Child at School,'' which included contact details of all the schools in Birmingham. The list was used to select schools randomly for inclusion in the study; every third school in South Birmingham was selected, giving a total of 29 schools. Selected schools were contacted by telephone, and an appointment was made with the head teacher in order to obtain permission to conduct the study. Of the 29 schools contacted, five were not interested in the study and 16 schools asked for additional information about the study to be sent in the post and indicated that they would be in contact if they were interested. Eight schools showed an immediate interest, and appointments were arranged with the head teacher of each school. A detailed explanation of the study was outlined at the initial appointment, and if the head teacher agreed for the school to participate in the study, a date was arranged for data collection.

All eight schools visited agreed to participate in the study; however, it was not possible for data to be collected from one of the schools since a mutually agreeable date could not be arranged within the time constraints of the present study (ie, before the summer holidays). Subjects with previous experience with orthodontic treatment were excluded from the study. These children were identified by the classroom teacher prior to data collection.

Consent

During the process of obtaining ethical approval from the East Birmingham Local Research Ethics Committee, participation/consent forms for both parents and children were assessed and approved for use in the present study. Consent/participation forms were given to the head teacher of each participating school for distribution to all Year 6 children 2 weeks prior to data collection. Children were asked to return the signed consent/participation form if they and their parent/guardian agreed to take part in the study. One of the authors was available on the day of the study to collect consent forms.

Orthodontists

A convenience sample of 31 orthodontists at the Birmingham Dental Hospital (BDH) and practicing in Birmingham, UK, participated in the study. They included six consultant orthodontists, 19 specialists in orthodontics, two senior registrars, and four registrars receiving training in orthodontics at BDH.

Methods

A simple data collection sheet was designed for subjects to record their age in years and months, gender, and perceptions of dental aesthetics (Figure 1). The 10 photographs representing the AC of IOTN were used as a tool to measure perceptions of dental aesthetics.[2] Five anterior photographs of the dentition were selected by the principal author to represent varying degrees of aesthetic impairment of Class III and AOB malocclusions, respectively (Figure 2). Photos

Age: _____ Years _____ Months

Gender: Male Female

Please look at all 10 photographs on the left of the slide and to note that photo 1 represented the 'most attractive' or 'nicest' looking set of teeth and photo 10 represented the 'worst'.

Please look at the ***lettered*** photo and select ***one of the numbered*** photos that look as 'attractive' or 'unattractive' as the lettered photograph and enter your answer in the table below:

Letter of photograph	Number you have selected
A	
B	
C	
D	
E	

Thank you

Figure 1. Data collection sheet.

were those of patients attending for treatment at the BDH. Each of the five photographs was randomly labeled with a letter code from A to E. Photograph (A) represented severe AOB, photo (B) an edge-to-edge incisor relationship representing a mild Class III and AOB malocclusion, photo (C) represented a severe C III malocclusion, photo (D) represented a moderate AOB, and photo (E) represented a moderate Class III malocclusion (Figure 2).

A PowerPoint 2007 presentation (Microsoft, Redmond, WA, USA) comprising five slides was prepared. Each slide displayed one of the five photos selected to represent Class III and AOB malocclusion as well as the AC of IOTN (Figure 3). The presentation was arranged so that the AC of IOTN would appear first on the left of each slide, followed by one of the five photos and corresponding letter code on the right (Figure 3). Subjects were first asked to look at all 10 photographs of the AC of IOTN and to note that photo 1 represented the most attractive or nicest looking set of teeth and photograph 10 represented the worst. They were then asked to select where they thought the lettered photo on the right should lie on the 10 point scale and to record their answer on the data collection sheet.

Data collection from schoolchildren was carried out in the classroom by one of the authors, with the teacher present. Exam conditions were maintained so that individual opinions were recorded without bias from peers or teachers. Data collection from orthodontists was carried out either in a lecture room or on a one-to-one basis by the authors under similar exam conditions.

Statistical Analyses

Statistical analysis was carried out using the SPSS statistical package (version 19.0.0; SPSS Inc, Somers, NY). A multivariate General Linear Model was carried out to examine the influence of sex, subject group, and photos on AC scores. Individual photo comparisons were carried out using a Mann-Whitney test. Significance levels were set at $P < .05$.

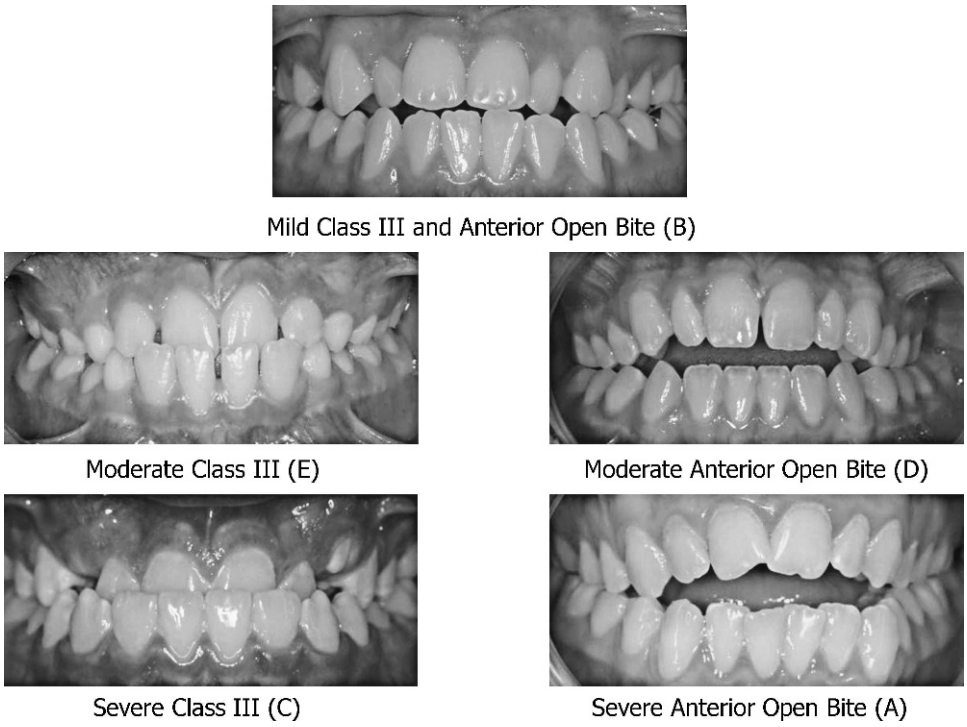

Figure 2. The five photographs representing Class III and AOB malocclusions with corresponding letter codes.

RESULTS

A total of 384 Year 6 primary schoolchildren participated in the study. This represented 10.4% of the target population. Data were collected from all 18 Year 6 classes in seven different schools. One girl did not complete the questionnaire fully and was therefore excluded from the study. This resulted in a final sample size of 383 subjects with a mean age of

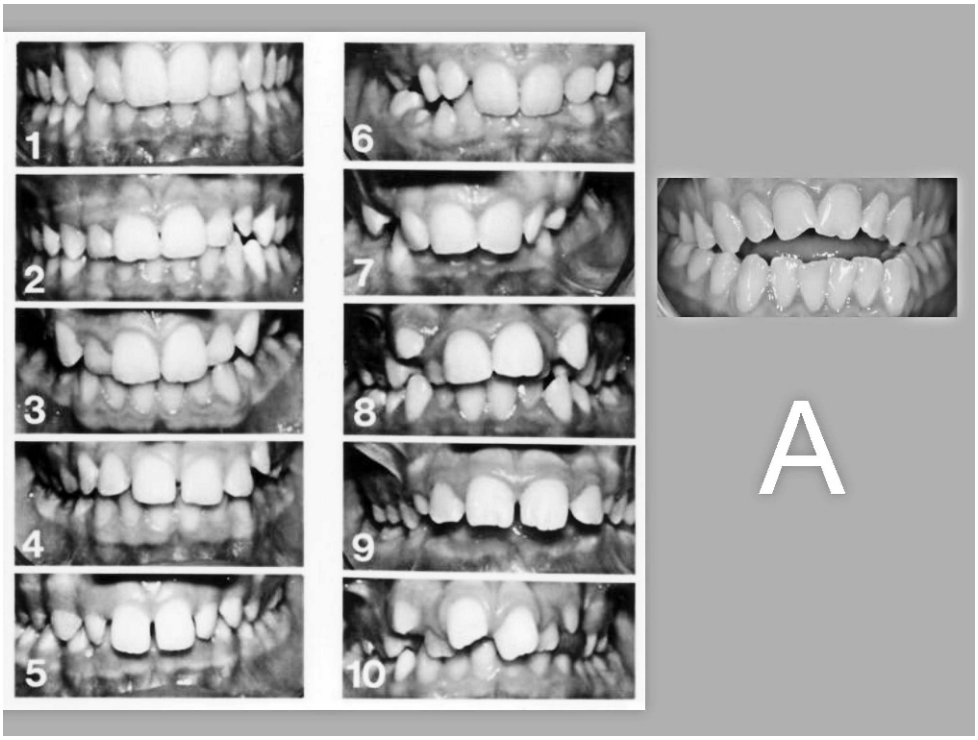

Figure 3. An example of one of the slides used to assess perceptions of dental aesthetics of a severe AOB malocclusion.

Table 1. Schoolchildren's Perceptions of Dental Aesthetics Using the AC of IOTN[a]

		Boys (n = 193)			Girls (n = 190)		
Code	Photograph	Median	Mean	SD	Median	Mean	SD
B		3.0	3.1	1.87	3.0	3.2	1.90
E		5.0	4.9	2.63	5.0	4.8	2.60
C		6.0	5.6	2.45	6.0	5.8	2.46
D		4.0	4.7	2.27	4.0	4.8	2.15
A		5.0	5.2	2.47	4.0	5.0	2.47

[a] AC indicates aesthetic component; IOTN, index of orthodontic treatment need; SD, standard deviation.
* There were no significant gender differences ($P > .05$).

11.0 years (SD = 0.48 years), almost equally divided according to gender (193 boys, 190 girls). Thirty-one orthodontists participated in the study (mean age = 39.5 years, SD = 9.6 years); 15 were males and 16 were females. Power calculations indicated that for the present sample size, a difference of one standard deviation would be detected with a power of 0.99 ($\alpha = .05$) for the sample of schoolchildren and 0.80 ($\alpha = .05$) for orthodontists.

Table 1 shows the schoolchildren's perceptions of dental aesthetics using the AC of IOTN. Boys and girls allocated the highest median AC scores to photos (C) and (E), representing severe and moderate Class III malocclusions, respectively. Boys allocated similar median AC scores to photos (A) and (E), representing severe AOB and moderate Class III malocclusions, respectively. The lowest median AC score was allocated to photo (B), which represented a mild Class III and AOB malocclusion (Table 1). Multivariate statistical analysis showed that gender (schoolchildren and orthodontists) was not a significant variable ($P > .05$), and the data were, therefore, pooled for further analysis.

Table 2 illustrates perceptions of dental aesthetics for schoolchildren and orthodontists. Multivariate statistical analysis showed that both subject group and photos were significant variables ($P < .05$). Further analysis of the data was carried out on an individual photo basis (Mann-Whitney test). Both groups allocated the highest median AC score to photo (C), representing severe Class III malocclusion; differences between groups were significant, with orthodontists allocating a higher score compared to schoolchildren (Table 2, $P < .05$). The lowest median AC score allocated by both groups was for photo (B), representing mild C III and AOB malocclusion (Table 2, $P > .05$). Although orthodontists allocated higher median AC scores for photos (A and E) compared to schoolchildren, differences were not significant ($P > .05$). Conversely, differences between groups for photo (D), representing a moderate AOB malocclusion, were significant (Table, $P < .05$).

DISCUSSION

Perceptions of dental aesthetics were similar among girls and boys (Table 1). This finding agrees with previous studies.[4,9,10,19,20] However, other investigations have shown gender differences, with females being more critical of dental aesthetics than males.[3,21–23] Both schoolchildren and orthodontists perceived Class III malocclusions to have greater aesthetic impairment compared to AOB malocclusions. The photos representing severe and moderate Class III malocclusions were allocated higher median AC scores compared to severe and moderate AOB malocclusions, respectively (Table 2). It appears that the reverse overjet illustrated in photos representing moderate and severe Class III malocclusions had a greater impact on perceptions of aesthetics compared to that of AOB for both orthodontists

Table 2. Comparison of Schoolchildren's and Orthodontist's Perceptions of Dental Aesthetics[a]

		School Children (n = 383)			Orthodontists (n = 31)			
Code	Photograph	Median	Mean	SD	Median	Mean	SD	*P* values
B		3.0	3.2	1.88	3.0	3.4	1.50	.331
E		5.0	4.9	2.61	6.0	5.0	1.89	.159
C		6.0	5.7	2.46	7.0	6.9	1.66	.003
D		4.0	4.7	2.21	4.0	3.8	1.70	.027
A		5.0	5.1	2.47	6.0	5.5	2.01	.545

[a] SD indicates standard deviation.

and schoolchildren. This finding has not been reported previously and requires further investigation.

Differences in perceived dental aesthetics between schoolchildren and orthodontists were significant for photos representing severe Class III and moderate AOB malocclusions, with orthodontists perceiving greater aesthetic impairment for severe Class III and schoolchildren for moderate AOB malocclusions, respectively (Table 2). Schoolchildren may have perceived the reverse overjet present in both moderate and severe Class III malocclusions to have similar aesthetic impairment. Conversely, the small gap between the top and bottom front teeth, representing a moderate AOB malocclusion, had a significantly greater aesthetic impact on schoolchildren than orthodontists. Orthodontists' perceptions may have been influenced by the apparent severity of the malocclusions and were, therefore, more critical in their assessments of the severe Class III malocclusion and less critical of the moderate AOB. Previous investigations using the AC of IOTN found that clinicians' ratings were more critical than child or lay opinion.[10,24–26] Conversely, Abu Alhaija and Al-khateeb [27] investigated attractiveness ratings using the AC of IOTN and found that assessments of severe reverse overjet were similar among dental professionals and non-dental students; however, differences in assessments of severe AOB were significant.[27] Care must be taken not to generalize the finding of the present study, as there is evidence to suggest that ethnicity and culturally related differences may play a role in variations of assessments of dental aesthetics.[28,29]

Validation of the AC using professional opinion as the ''gold standard'' has identified cut-off points for three categories of treatment need. Photos 1–4 indicate ''No treatment need,'' 5–7 indicate ''Borderline need,'' and 8–10 indicate ''Definite treatment need.''[30] Surprisingly, none of the median AC scores allocated to the five photos used in the present study were in the ''Definite treatment need'' category. Severe and moderate Class III and severe AOB malocclusions were allocated to the ''Borderline need'' category, whereas moderate AOB and edge-to-edge malocclusions were allocated to the ''No treatment need'' category. Schoolchildren and orthodontists may have found it hard to assess aesthetic impairment of the photos representing Class III and AOB malocclusions because neither of these malocclusions was represented in the current AC of IOTN. Perhaps the inclusion of representative photos of Class III and AOB malocclusions may increase the sensitivity of this Index. Alternatively, both groups may not have perceived an aesthetic impairment worthy of definite treatment need. These findings merit further investigation.

The limited number of primary schools that agreed to participate in the study (eight out of 82) and the convenience sample of 31 orthodontists were potential limiting factors to the present study. The authors made every effort to include as many primary schools as possible, but the majority did not show an interest. Furthermore, a more random sample of orthodontists would have been more appropriate; however, this was deemed impractical within the time constraints of the present study.

CONCLUSIONS

- Perceptions of dental aesthetics of Class III and AOB malocclusions were similar among males and females.
- Differences in perceived dental aesthetics between schoolchildren and orthodontists were significant for photos representing severe Class III and moderate AOB malocclusions, with orthodontists perceiving greater aesthetic impairment for severe Class III and schoolchildren for moderate AOB, respectively.
- Both schoolchildren and orthodontists perceived Class III malocclusions to have greater aesthetic impairment compared to AOB malocclusions.
- Surprisingly, none of the median AC scores allocated to the five photos used in the present study were in the ''Definite treatment need'' category.

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