

ORIGINAL ARTICLE

Normative and self-perceived orthodontic treatment need in Nigerian school children

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Abstract

Objective. The aim of this study was to assess the normative and self-perceived need for orthodontic treatment in Nigerian children, and to evaluate distribution of orthodontic treatment need according to gender and age. **Materials and methods.** The sample consisted of 441 randomly selected school children, aged 11–18 years in Benin City, Nigeria. The subjects were further sub-grouped according to gender (229 males and 212 females) and age (246 11–13 years old and 195 14–18 years old). The Dental health Component (DHC) and Aesthetic Component (AC) of Index of Orthodontic Treatment Need (IOTN) were used to assess orthodontic treatment need normatively. Self-perceived need was evaluated by asking the subjects to rate their dental aesthetics on the Aesthetic Component scale of IOTN. Chi-square tests were used to evaluate gender and age differences in distribution of treatment need. **Results.** A definite need for orthodontic treatment was found among 21.5% (grades 4–5 of DHC) and 6.3% (grades 8–10 of AC) of the subjects; 3.9% of the subjects perceived a definite need for orthodontic treatment (grades 8–10 of AC). There were no statistically significant gender and age differences in distribution of orthodontic treatment need among the subjects ($p > 0.05$). **Conclusion.** The study revealed a need for orthodontic treatment in slightly more than one fifth (21.5%) of this sample of Nigerian children. The sample population has a lower need on aesthetic grounds and their normative and self-perceived orthodontic treatment needs were not influenced by gender and age.

Key Words: *index of orthodontic treatment need, malocclusion, orthodontic treatment need*

Introduction

The determination of the orthodontic treatment need within a population is of paramount importance since it will facilitate efficient planning and provision of orthodontic treatment. The need for orthodontic treatment is most often normatively assessed with the use of occlusal indices and prevalence of orthodontic treatment need has been reported in different populations [1]. However, the individual's perception of dental appearance and attitude towards malocclusion is also an important factor to be considered in determining the need for orthodontic treatment [2]. Physical attractiveness which included dental aesthetics plays a major role in terms of an individual's own self-esteem and social interaction [3–5]. The desire to look attractive, self-esteem, gender, age and social status are important factors that can influence the self-perception of dental appearance,

determination of the potential benefits of orthodontic treatment for an individual and uptake of orthodontic treatment [6]. Studies have shown that an important motivation for orthodontic treatment is often to improve dentofacial appearance and the psychosocial benefits of treatment could actually take prominence over improvements in function and dental health from a patient's perspective [7].

The Index of Orthodontic Treatment Need (IOTN) developed by Brook and Shaw [7] and later modified by Richmond et al. [8] has been widely accepted, validated and found reliable as a method of objectively assessing orthodontic treatment need. The IOTN is made up of Aesthetic Components (AC) and Dental Health Component (DHC). The AC of the IOTN has been found useful in the assessment of perceived dental appearance from the patient's perspective [6,9,10]. The AC consists of a scale of 10 colour photographs showing different

levels of dental attractiveness, with grade 1 representing the most attractive dentitions and grade 10 the least attractive dentitions, while the DHC records the various occlusal traits considered to increase the morbidity of the dentition. The IOTN actually ranks various occlusal traits in terms of their significance for an individual's dental health and perceived aesthetic impairment, with the intention of identifying those individuals who will benefit most from orthodontic treatment. Application of the IOTN will, therefore, be a suitable tool for determination of the individuals with high orthodontic treatment need in Nigeria, which presently has a low orthodontist-to-population ratio and where most orthodontic services are delivered by fee-for-service modality.

Presently, there is insufficient application of the IOTN in different age groups of the school population in Benin City, with information only available for children aged 12–14 years [11,12]. Therefore, the aim of this study was to assess the normative and self-perceived orthodontic treatment need and distribution of orthodontic treatment need according to gender and age among children and adolescents in Benin City, south-southern region of Nigeria.

Materials and methods

The study sample comprised 441 children, 229 males (52%) and 212 females (48%), randomly selected from four secondary schools in Benin City, Edo State in the south-southern region of Nigeria. The subjects were selected from public and private schools in order to have representation of children and adolescents from a wide socio-economic background. The subjects were aged 11–18 years old (mean age of 13 years \pm 1.8) and were further sub-grouped according to age, 246 11–13 years old and 195 14–18 years old. None of the children had any previous history of orthodontic treatment. Approval was obtained from the schools' administrators before the survey was carried out and the parents who agreed to have their children examined gave informed consent.

The subjects were examined for orthodontic treatment need with the Dental Health (DHC) and Aesthetic (AC) Components of the Index of Orthodontic Treatment Need (IOTN) within their school compound by the author, who had been previously calibrated in the use of IOTN. Illumination was provided by natural light. The subjects were then asked to rank their dental attractiveness in relation to the photograph which closely matched the appearance of their anterior teeth in the AC scale of the IOTN to determine their subjective orthodontic treatment need.

The AC consists of a scale of 10 colour photographs showing different levels of dental attractiveness, with grade 1 representing the most attractive dentition and grade 10 the least attractive dentition. Following a validation exercise by Richmond et al. [8], these

grades have been grouped to represent the need for orthodontic treatment on aesthetic grounds, with grades 1–4 representing 'no or little need', grades 5–7 'borderline need' and grades 8–10 a definite need for treatment on aesthetic grounds.

The DHC of the IOTN records the various occlusal traits considered to increase the morbidity of the dentition. There are five grades which have been grouped following validation into grades 1 and 2 representing 'no need for treatment', grade 3 representing 'borderline' cases and grades 4 and 5 representing those in 'definite or great need of orthodontic treatment'.

The intra-examiner reproducibility was assessed by re-examination of 25 randomly selected children 4 weeks after their initial examination. Kappa values for the DHC and AC were 0.78 and 0.80, respectively, indicating substantial agreement [13].

The data analysis was carried out with Statistical Package for Social Sciences software version 17 (SPSS Inc., Chicago, IL). Statistical significance in the distribution of normative and self-perceived orthodontic treatment need based on gender and age were evaluated with the chi-square test. Statistical significance was regarded when $p < 0.05$.

Results

The study revealed that 21.5% of the subjects had normatively determined definite need for orthodontic treatment (grades 4 and 5 of the DHC), while 17.7% required moderate or borderline need, as shown in Table I.

Table II shows that the majority of the children (93.2%) rated their dental aesthetics from the no or little need treatment grades 1–4 on the AC scale, while 3.9% perceived a definite need for orthodontic treatment; 6.3% of the subjects also had normatively determined defined need for orthodontic treatment on aesthetic grounds. There was no statistically significant differences in dental aesthetics rating on the AC scale between the examiner and subjects ($p > 0.05$).

The normative distribution of treatment need on aesthetic grounds was not statistically different according to gender and age ($p > 0.05$), as shown in Table III. However, females and children aged 11–13 years had a higher borderline need for orthodontic

Table I. Distribution of Dental Health Component (DHC) grades of IOTN among the children.

DHC Grades	Treatment need	<i>n</i>	%
Grade 1 and 2	No/ little need	268	60.8
Grade 3	Moderate/borderline need	78	17.7
Grade 4 and 5	Great/ definite need	95	21.5
Total		441	100.0

Table II. Evaluation of treatment need with Aesthetic Component (AC) of IOTN.

	Subjective		Normative	
	<i>n</i>	%	<i>n</i>	%
Grade 1–4 (No/little need)	411	93.2	377	85.5
Grade 5–7 (Moderate/borderline need)	13	2.9	36	8.2
Grade 8–10 (Great/definite need)	17	3.9	28	6.3
Total	441	100.0	441	100.0

$\chi^2 = 3.450$; $p > 0.05$.

Table III. Normative evaluation of treatment need on the AC scale of IOTN according to gender and age.

	No need		Borderline need		Definite need		<i>p</i> -value
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
<i>Gender</i>							0.648
Males	197	86.0	15	7.0	17	7.0	
Females	180	85.0	21	10.0	11	5.0	
<i>Age</i>							0.648
11–13 years	211	85.0	23	10.0	13	5.0	
14–18 years	166	86.0	13	7.0	15	7.0	

No significant differences as $p > 0.05$.

treatment than males and children aged 14–18 years, who conversely had a higher definite need.

Table IV shows that gender and age did not statistically influence self-rating of dental aesthetics among the subjects ($p > 0.05$), even though the males and older children aged 14–18 years perceived a higher need for borderline and definite orthodontic treatment than females and children aged 11–13 years old.

Table IV. Self-perceived treatment need on AC scale of IOTN according to gender and age.

	No need		Borderline need		Definite need		<i>p</i> -value
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
<i>Gender</i>							0.858
Males	211	92.0	8	4.0	10	4.0	
Females	200	94.0	5	3.0	7	3.0	
<i>Age</i>							0.535
11–13 years	233	95.0	6	2.0	7	3.0	
14–18 years	178	91.0	7	4.0	10	5.0	

No significant differences as $p > 0.05$.

Discussion

This study revealed slightly more than one fifth (21.5%) of this sample of Nigerian children had malocclusion and occlusal traits that would require a definite need for orthodontic treatment on the basis of the DHC of IOTN. This observation was similar to the frequency of 19.2% previously reported among school children in Benin City [11], but higher than the 12.6% reported in rural Nigerian adolescents [14]. The normative need for orthodontic treatment observed among Nigerian children in this present study is consistent with the 21.3% reported in French children [15] and 21.8% reported in 12-year-old Spanish school children [16], but lower than the frequency of average of one third or more reported in British [7,17,18], Irish [19], Jordanian [20], Swedish [21] and Turkish [22] populations, and also similar to the 22% reported in Tanzanian children [23] who are of African descent, suggesting the possibility of racial differences in need for treatment. However, the sample composition and age of subjects evaluated could also contribute to differences in the distribution of treatment need in the various populations [1].

The assessment with the AC of IOTN revealed that 6.3% of Nigerian children had malocclusion that warranted a definite need for orthodontic treatment and 8.2% required a borderline need. The lower prevalence of definite need on aesthetic grounds when compared to the dental health component was consistent with findings in other populations [7,15,22]. There were no significant statistical differences in the examiner and subjects rating of the AC of IOTN in this study. However, the majority of the children (93.2%) rated their dental aesthetics from the no or little treatment grades (1–4), with only 2.9% and 3.9% expressed moderate and definite need for orthodontic treatment, respectively, which were lower than normatively determined orthodontic treatment need. A significant positive correlation for dental aesthetic ratings between orthodontist and lay persons have been reported in some studies [24], while other investigations reported significant differences in aesthetic evaluation between the orthodontist and the subjects, with the subjects evaluating their dental appearance more favourably than the examiner [6,10,15,25].

The normative treatment need assessed with the AC scale was not significantly influenced by age and sex, even though a higher score for definite need was observed for males and the older age group (11–14 years), while borderline need was more necessary in the females and younger age group. This observation was also consistent with similar findings among the Jordanian school children [26]. There was also no statistical gender and age differences in the self-perceived orthodontic treatment need evaluated by means of AC of IOTN. However, the females (94%)

rated their dentition more from the attractive end of the scale than males (92%), which is also similar to findings in other studies [26]. The prevalence of males who rated their dental aesthetics from borderline and definite treatment need grades were, however, higher than females. The children aged 11–13 years (95%) rated their teeth more attractive in this study, while the older children rated their dental aesthetics more from the borderline and definite treatment need grades. This finding is in contrast to older Jordanian children aged 17 years who rated their teeth more aesthetically acceptable than the 13-year-old children [26]. This present study, therefore, shows more definite orthodontic treatment need in males and older Nigerian children aged 14–18 years, with also considerable borderline orthodontic treatment need in females and children aged 11–13 years.

The information obtained in this study is, therefore, of utmost importance, as the normative need is not the only necessary decisive factor for uptake of orthodontic treatment but also the patients' perception of malocclusion will influence their demand for orthodontic care.

Conclusion

This study revealed orthodontic treatment need in slightly more than one fifth (21.5%) of this sample of Nigerian children, with a higher need for treatment on dental health than aesthetic grounds. Gender and age did not significantly influence the distribution of normative and self-perceived orthodontic treatment need among the children. The data obtained will aid in the planning and provision of orthodontic treatment among Nigerian children.

Declaration of interest: The author reports no conflicts of interest. The author alone is responsible for the content and writing of the paper.

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