



## Normative and perceived orthodontic treatment need of senior year dental students

*Necessidade normativa e percebida de tratamento ortodôntico de estudantes de odontologia do último ano*

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### Abstract

**Objective:** The purpose of this study was to determine perceived and normative orthodontic treatment need of senior year dental students using the Index of Orthodontic Treatment Need (IOTN) and Dental Aesthetic Index (DAI). **Materials and Methods:** Ninety-nine senior year students of the Faculty of Dentistry, Obafemi Awolowo University Ile-Ife, Nigeria, participated. Normative assessment of occlusal characteristics was carried out using IOTN and DAI while the Aesthetic Component (AC) scale of IOTN was used by the students to assess perceived need. **Results:** With the AC scale of IOTN, 6.1% of the students expressed “borderline need” and 2% “great need” for treatment, while normative need was 41.4% for “borderline need” and 11.1% for “great need”. The Dental Health Component found 37.4% and 24.2% in these categories, respectively. The DAI gave 26.3%, 13.1% and 15.1% in the elective treatment, highly desirable treatment and mandatory treatment categories respectively. No gender-dependent differences were found. Moderate correlation was observed between perceived and normative need ( $r=0.643$ ), which was significant ( $p<0.001$ ). **Conclusions:** Over half of the dental students had orthodontic treatment need with both indices. Normative and perceived treatment need differed significantly. The perception of treatment need is not only influenced by knowledge and severity of malocclusion, as psychosocial factors acting on individuals may be involved.

**Keywords:** Orthodontic treatment need. Perception. Malocclusion.

## Resumo

**Objetivo:** O objetivo deste estudo foi determinar a necessidade normativa e percebida de tratamento ortodôntico de estudantes de odontologia do último ano, utilizando o Índice de Necessidade de Tratamento Ortodôntico (IOTN) e o Índice de Estética Dental (DAI). **Materiais e Métodos:** Participaram do estudo 99 alunos do último ano da Faculdade de Odontologia, Obafemi Awolowo University Ile-Ife, Nigéria. A avaliação normativa de características oclusais foi realizada utilizando IOTN e DAI, enquanto a escala do componente Estética (AC) do índice IOTN foi utilizada pelos alunos para avaliar a necessidade percebida. **Resultados:** Em relação à escala AC do IOTN, 6,1% dos estudantes expressaram “necessidade intermediária” e 2% “grande necessidade” de tratamento, enquanto a necessidade normativa foi de 41,4% para “necessidade intermediária” e 11,1% para “grande necessidade”. O Componente de Saúde Dental encontrou 37,4% e 24,2% nestas categorias, respectivamente. O DAI detectou 26,3%, 13,1% e 15,1% para as categorias tratamento eletivo, tratamento altamente desejável e tratamento obrigatório, respectivamente. Não houve diferenças quanto ao gênero. Foi observada correlação moderada entre a necessidade percebida e normativa ( $r=0,643$ ), sendo esta significativa ( $p<0,001$ ). **Conclusão:** Detectou-se necessidade de tratamento ortodôntico em mais da metade dos estudantes de odontologia em ambos os índices. As necessidades normativa e percebida de tratamento diferiram significativamente. A percepção da necessidade de tratamento não é influenciada apenas pelo conhecimento e pela severidade da má oclusão, pois fatores psicossociais que atuam sobre os indivíduos também podem estar envolvidos.

**Palavras-chave:** Necessidade de tratamento ortodôntico. Percepção. Má oclusão.

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## Introduction

General dentists are often the first dental professionals to suggest orthodontic treatment and refer accordingly to the orthodontist (1). The strong impact of GDP in influencing patients and the decision of their parents to undergo orthodontic treatment has been confirmed in many studies (2, 3)

Perception has been defined as the process by which patterns of environmental stimuli are organized and interpreted, while aesthetics is defined as the appreciation or the enjoyment of beauty (4). Research has shown that there are differences between various groups of individuals in their perception of dental aesthetics, need, desire for and uptake of orthodontic treatment, which makes the measurement of aesthetic impairment difficult (5). People appear to detect specific dental aesthetic discrepancies at varying levels of deviation (6). Judgments of dental aesthetics may vary even among dental professionals (7).

Various physical, psychological and social factors affect perceptual judgment, which include differences in the recognition of deviant occlusal features, non-availability of orthodontic services, personal factors such as age, gender and

socioeconomic status, personal knowledge and values (8). The body image of a person is thought to be, in part, a product of his or her personal experiences, personality and other social and cultural forces. Judgments of acceptable and unacceptable occlusion could also be idiosyncratic.

Dental students, as health professionals of the future, must adopt accurate oral health attitudes and behavior for directing their patients appropriately (9). Irrespective of the dental specialty they may eventually pursue, they should be able to give accurate prescriptions about orthodontic treatment needs. Therefore, it is necessary to understand how they perceive and assess malocclusions and the need for orthodontic treatment, not only as dental professionals but also as consumers of care.

The dental school curriculum in Nigeria runs for a period of six years, divided into pre-clinical and clinical training, with the duration of three years each. Orthodontics is taught in the Department of Child Dental Health during the clinical years. Senior year dental students have therefore had about three years of exposure to orthodontics. Exposure to orthodontics has been found to increase dentofacial awareness while a high level of education is also known to have a substantial influence on oral health attitudes and behavior of an

individual (10). Other studies have also found that the level of education and availability of orthodontic treatment affects the desire for treatment (11).

Few studies have documented the need for orthodontic treatment among dental students (12, 13) but none has been carried out in a Nigerian population. The aim of this study was to assess self-perceived and normative orthodontic treatment need of senior year dental students using the Index of Orthodontic Treatment Need (IOTN) (14) and Dental Aesthetic Index (DAI) (15).

## Materials and methods

Two sets of final year dental students in Obafemi Awolowo University Ile-Ife, Osun, Nigeria, participated in this study. Obafemi Awolowo University is one of the first generation universities located in South Western Nigeria with a Faculty of Dentistry. The students were invited to participate in the study after being informed verbally about the purpose of the study. Ethical approval was obtained from the Obafemi Awolowo University Teaching Hospital Ethics Committee. One of the interviewed students who was already undergoing orthodontic treatment was excluded from the study.

Self-assessment of participants was performed using the Aesthetic Component (AC) scale of the Index of Orthodontic Treatment Need (IOTN). Each senior year dental student was asked to assess the position they felt their teeth would lie on the scale, it was emphasized that a general perception was being sought not an exact match with any of the photographs. Thereafter, clinical examination was carried out at the orthodontic unit of the university teaching hospital by an orthodontist who used occlusal indices.

Occlusal features were assessed professionally using both Aesthetic Component (AC) and Dental Health Components (DHC) of the IOTN and Dental Aesthetic Index (DAI). With the AC component of IOTN, A rating was allocated by the examiner for overall dental attractiveness rather than specific morphological similarity to the photographs. The obtained value gave an indication of treatment

need on the grounds of aesthetic impairment. On the Dental Health Component (DHC), each occlusal trait thought to contribute to the longevity and satisfactory functioning of the dentition was defined, and easily measurable cut off points between each grading have been established. Dental health impairments were sought for, with the most severe trait identified for each participant being the basis for grading the need of the individual for treatment on dental health grounds.

The DAI uses 10 morphologic characteristics that represent dental features that have been determined to influence the perception of dental aesthetics the most. These 10 occlusal traits were determined for each participant and multiplied by the weighting factor, the summation of these products, and a constant produced the total DAI score.

Statistical analysis was conducted using SPSS version 16.0. Descriptive statistics was used to determine the frequency distribution and percentage ratio. Chi-squared test was used to determine differences in the distributions according to sex. The AC and DHC components of the IOTN and DAI were also compared using Spearman's correlation coefficient test. A probability at the 5 percent level or less ( $p \leq 0.05$ ) was considered statistically significant.

## Results

Ninety-nine senior year dental students participated in the study, being 35 (35.4%) females and 64 (64.6%) males, aged between 22 and 30 years old with a mean age of  $26.26 \pm 1.96$ .

The results of the assessment of aesthetics using the AC scale of IOTN by the dental students and orthodontist are presented in Table 1. Among the students, 91.9% expressed "no need" for treatment, 6.1% expressed "moderate or borderline need", and 2% expressed "great need" for treatment. While the assessment orthodontist gave 47.5% as having "no need", 41.4% "borderline need" and 11.1% "great need" for orthodontic treatment. There was a significant difference in the assessment of treatment need between the students and professional on this scale.

**Table 1** - Orthodontic treatment need according to the Aesthetic Component (AC) scale of IOTN

AC Categories	Perceived Need			Normative Need		
	Female N (%)	Male N (%)	Total N (%)	Female N (%)	Male N (%)	Total N (%)
<b>1-4 (no need)</b>	31 (31.3)	60 (60.6)	91 (91.9)	17 (17.2)	30 (30.3)	47 (47.5)
<b>5-7 (borderline need)</b>	4 (4.1)	2 (2.0)	6 (6.1)	16 (16.2)	25 (25.2)	41 (41.4)
<b>8-10 (great need)</b>		2 (2.0)	2 (2.0)	2 (2.0)	9 (9.1)	11 (11.1)

Note: Likelihood ratio = 50.39; p=0.000.

Table 2 shows orthodontic treatment need on dental health grounds. About equal proportions fell in the “no need” and “borderline need” for treatment categories, while about a quarter of them had definite need for treatment. No gender difference

was observed in need for orthodontic treatment assessed by both components of the IOTN.

The mean DAI score was  $27.70 \pm 8.19$ , which also showed no significant gender difference. Table 3 presents the distribution of treatment need

**Table 2** - Orthodontic treatment need according to the Dental Health Component (DHC) of IOTN

DHC Score	Treatment category	Female N (%)	Male N (%)	Total N (%)
<b>Grades 1 and 2</b>	No treatment need	13 (13.1)	25 (25.3)	38 (38.4)
<b>Grade 3</b>	Borderline treatment need	14 (14.2)	23 (23.2)	37 (37.4)
<b>Grades 4 and 5</b>	Great treatment need	8 (8.1)	16 (16.1)	24 (24.2)

Note:  $X^2=0.164$ ;  $df=2$  p; value=0.921.

**Table 3** - Orthodontic treatment need according to the Dental Aesthetic Index (DAI)

DAI Score	Treatment category	Female N (%)	Male N (%)	Total N (%)
<b>&lt; 25</b>	No treatment	17 (17.2)	28 (28.3)	45 (45.5)
<b>26-30</b>	Elective treatment	8 (8.1)	18 (18.2)	26 (26.3)
<b>31-35</b>	Highly desirable treatment	5 (5.0)	8 (8.1)	13 (13.1)
<b>&gt; 36</b>	Mandatory treatment	5 (5.0)	10 (10.1)	15 (15.1)

Note:  $X^2 = 0.437$   $df = 3$  p value = 0.933.

according to the DAI scores, which shows that 45.5% had no treatment need, in 26.3% treatment was considered elective, in 13.1% it was considered highly desirable, and in 15.1% treatment was considered mandatory.

Spearman's correlation coefficient test was used to compare perceived and normative treatment need using both orthodontic indices. The result is presented in Table 4.

found between male and female participants regarding the assessment of dental aesthetics in this study, similarly to previous reports (18, 19), although Dawjee et al. (20) found females to show a greater awareness about aesthetics and appearance than their male counterparts.

Based on aesthetic evaluation, the majority of students expressed no need for orthodontic treatment, differing significantly from professional

**Table 4** - Spearman's correlation test between perceived and normative orthodontic treatment need

	Perceived Need (AC OF IOTN)	Normative Need (AC OF IOTN)	DHC OF IOTN	DAI
Perceived Need (AC OF IOTN)	1.000	0.643 (0.000)	0.332(0.001)	0.616 (0.000)
Normative Need (AC OF IOTN)	0.643 (0.000)	1.000	0.512 (0.000)	0.746 (0.000)
DHC OF IOTN	0.332 (0.001)	0.512 (0.000)	1.000	0.422 (0.000)
DAI	0.616 (0.000)	0.746 (0.000)	0.422 (0.000)	1.000

Note: Correlation is significant at the .01 level (2-tailed).

Moderate correlation was observed between perceived and normative treatment need ( $r=0.643$ ), and both components of the IOTN assessed by the orthodontist ( $r=0.512$ ). A high correlation was however observed between normative treatment need using the AC scale of IOTN and the DAI ( $r = 0.746$ ). All correlations were significant ( $p<0.001$ ).

## Discussion

There is growing emphasis on cosmetic dentistry and it is generally believed that people are becoming more aware of the importance of aesthetics especially in the integration of the individual in society (13, 16). The demand for orthodontic treatment by adult patients has grown much more in the last 20 years (17).

This study assessed subjective and normative orthodontic treatment need of senior year dental students. The majority of the participants were male, this could have been an incidental finding, or may be due to the sex role stereotyping in our society, wherein greater emphasis is placed on the education of the male child. No difference was

assessment. This is similar to previous reports (21, 22). De Mûelenaere et al. (14) observed a similar trend among senior dental students in Pretoria South Africa, as well as Balçoş et al. (15) among Iasi dental students. Kuroda et al. (23) reported that the perception of treatment need was significantly different among dental students, residents and orthodontists.

The observed differences could be due to the evaluation of the students regarding their occlusion from memory. Individuals, including dentists, may be casual observers of their own dentofacial appearance, a look in a mirror before evaluation could have enhanced their ratings. They may also have been biased based on their knowledge and found it difficult to admit their level of treatment need when confronted with the IOTN photographs.

Our result with the DHC of IOTN was quite different from that of de Mûelenaere et al. (14). Less than 40% of our students had "no need" for treatment on Dental Health grounds. A similar pattern was however found with more participants having treatment need on dental health than aesthetic grounds. This reinforces the fact that there are significant dental health risks associated with malocclusion, which

should not be taken for granted during orthodontic assessment.

It is significant that the DAI reported about 15% of these senior year dental students as having “very severe” malocclusion in whom treatment was considered mandatory. This is high compared to previous reports with the DAI in this environment (24, 25). It is particularly striking that this observation is made among dental students close to the receipt of treatment. The low orthodontic utilization observed in spite of normative treatment need was unexpected since it is known that information empowers people to take charge of their health (26) and raising awareness about malocclusion is important for avoiding delays in seeking treatment (27). However, it is also known that the motivation for treatment is greatly influenced by self-perception (28).

It has been opined that perception of treatment need does not depend solely on the level of severity of the malocclusion but on the impact on psychosocial wellbeing and quality of life of the individual. These students probably experienced minimal impacts of malocclusion on their quality of life, which could be due to the absence of pain and the fact that malocclusions are not life threatening. In a study among students in Singapore, 49% perceived a need but did not elect treatment (29), while demand exceeded treatment need determined by IOTN among Polish schoolchildren (30). Previous reports indicate that the orthodontic appliance is worn as a “badge of honor” or status symbol in some Caucasian communities (31).

The AC scale of IOTN and DAI were able to identify similar proportions of students having “no need” for treatment. While correlation between normative treatment need determined by the AC and DHC components of IOTN was only moderate, the DAI and AC scale of IOTN demonstrated a much stronger relationship. Both the AC scale of IOTN and DAI are based on the aesthetic perceptions of groups and reflect the socio-psychological need for orthodontic treatment.

Occlusal indices were developed to ensure uniformity in the assessment of malocclusions and treatment prescriptions, in practice, however, it may be influenced by the level of familiarity. Evaluation of malocclusions with occlusal indices by these dental students is therefore expected to improve with

increasing experience in dentistry and orthodontics after graduation.

Self-perception of occlusion appears to have the greatest influence on the uptake of orthodontic treatment. Although beauty is in the eye of the beholder, and judgments of dental aesthetics may vary depending on individual aesthetic standards. Individuals must realize that there is a minimum achievable balance that creates a pleasing appearance (32).

This study corroborates the opinion that normative and perceived orthodontic treatment need to represent different standpoints and should always be considered before treatment prescriptions are given (33). Further studies comparing self-perception and assessment of treatment need by dental students, house officers, non-orthodontic residents and consultants are necessary.

## Conclusions

There was a significant difference in the assessment of treatment need between dental students and a graduated orthodontist. From this study, it appears that perception of treatment need and treatment uptake does not depend solely on knowledge and level of severity of the malocclusion, other psychological and social factors may be involved.

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