

Dental esthetics and oral health-related quality of life in young adults

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Introduction: Dental esthetics affects how people are perceived by society and how they perceive themselves, and this may also affect their oral health-related quality of life (OHRQoL). The aim of this study was to compare the impacts of self-perceived and normatively assessed dental esthetics on the OHRQoL of a young adult population. **Methods:** This was a cross-sectional descriptive study involving 375 undergraduate university students, aged 18 to 30 years old. Data collection was carried out through oral examinations and self-administered questionnaires. Dental esthetics of the students was assessed using the esthetic component of the Index of Orthodontic Treatment Need. Two OHRQoL instruments were used: the shortened version of the Oral Health Impact Profile and the Psychosocial Impact of Dental Aesthetics Questionnaire. **Results:** Statistically significant relationships ($P < 0.05$) were recorded between both self-perceived and normatively assessed dental esthetics of the students, respectively, and 3 of the 4 Psychosocial Impact of Dental Aesthetics Questionnaire subscales: dental self-confidence (Kruskal-Wallis, $P = 0.000$; $P = 0.000$), psychological impact ($P = 0.003$, $P = 0.047$), and esthetic concern ($P = 0.006$, $P = 0.003$). The only exception was the social impact subscale, in which a significant relationship was recorded only with self-perceived dental esthetics ($P = 0.040$). For the shortened version of the Oral Health Impact Profile scale, marked differences were also observed between the impacts recorded for both self-assessments and normative assessments, respectively, particularly for the psychological disability domain (Fisher exact test, $P = 0.021$, $P = 0.000$; $P = 0.064$, $P = 0.096$). **Conclusions:** Differences exist between the impacts of self-perceived and normatively assessed dental esthetics on the OHRQoL of young adults, particularly in the psychosocial domains. These differences should be considered in orthodontic treatment planning for young adult populations. (Am J Orthod Dentofacial Orthop 2016;150:627-36)

Facial and dental attractiveness represents important elements of quality of life for patients seeking orthodontic treatment. Most of these patients are often more concerned with improving their appearance and social acceptance than they are with improving their

oral function or health.¹ This is reinforced by the fact that research has shown that people may be judged by others based on their dental esthetics; with poor dental esthetics in children and adults associated with lower intelligence, whereas adults with ideal smiles are considered more intelligent and have a greater chance of finding a job, than do those with nonideal smiles.^{2,3}

However, there are considerable differences between a clinician's and a patient's perceptions of dental appearance and needs for orthodontic treatment.⁴ The clinician often uses traditional methods of measuring dental health and appearance, such as the Index of Orthodontic Treatment Need (IOTN) and the Dental Aesthetic Index; these cannot create a living picture of how people's daily lives are affected by oral health issues.^{5,6} A major limitation of this approach is that it fails to take into account the way people really feel and therefore does not correspond to broader concepts of health and needs.⁷ To overcome this shortcoming, research has focused on developing broader sociodental concepts of oral health and as a result

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numerous sociodental or oral health-related quality of life (OHRQoL) measures have been developed.⁶

OHRQoL is defined as “a standard of health of the oral and related tissues which enables an individual to eat, speak and socialize without active disease, discomfort or embarrassment,”⁸ or “the absence of negative impacts of oral conditions on social life and a sense of dentofacial self-confidence.”⁹ Assessment of OHRQoL allows a shift from the traditional medical and dental criteria to assessment and care that focus on a person’s social and emotional experiences and physical functioning in defining appropriate goals and outcomes.⁷ These measures have mainly been used to assess the impact of oral health on daily life and the relationship between subjective and clinical measures, and at the same time exploring their use as a screening tool for clinical measures.¹⁰ The use of OHRQoL measures as a part of the diagnostic procedures can provide information on priorities for treatment to maximize patient satisfaction.^{11,12}

Liu et al,¹³ in a systematic review to assess the impact of malocclusion and orthodontic treatment need on quality of life, reported a modest association between malocclusion and the need for orthodontic treatment with quality of life. This review highlighted the fact that most studies in this area had been restricted to children and adolescents. Thus, the authors recommended the need for future studies in adults, using standardized OHRQoL assessment instruments. Two good examples of these standardized instruments are the shortened version of the Oral Health Impact Profile (OHIP-14)¹⁴ and the Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ).¹⁵

The few studies that focused on adults have suggested that dental esthetics can have direct effects on all OHRQoL values.^{16–21} However, bearing in mind the differences between clinicians’ and patients’ perceptions of dental appearance and needs for orthodontic treatment, an important consideration not addressed in these studies is whether there is any difference between the impacts of self-perceived and normatively assessed dental esthetics on OHRQoL in young adults. The need for this study is further reinforced by the increasing percentage of adults seeking orthodontic treatment.²² Thus, the aim of this study was to compare the impacts between self-perceived and normatively assessed dental esthetics on the OHRQoL of a young adult population.

MATERIAL AND METHODS

This was a cross-sectional study carried out with 420 undergraduate university students aged 18 to 30 years, chosen from 4 randomly selected residence halls (2 male

and 2 female halls) at the University of Lagos, Akoka, Lagos, Nigeria, with a total student population of slightly over 50,000. Ethical approval for the study was obtained from the institutional review board, and permission to carry out the study was also obtained from the university’s Students’ Affairs Office. In addition, informed written consent was obtained from all students selected to participate in the study after it had been fully explained to them.

The study was restricted to students of native Nigerian origin: ie, students with Nigerian parents. In addition, students with a current or previous history of orthodontic treatment were not excluded from the study. Data were collected through self-administered questionnaires, interviews, and dental examinations performed by 2 orthodontists (G.I.I. and another). Dental esthetics was assessed using the aesthetic component of the IOTN (AC-IOTN).²³ This was used to assess the self-perceived and normatively assessed dental esthetics of the students. The AC-IOTN records any esthetic impairment through a 10-point photographic scale with progressive degrees of esthetic problems, ranging from 1 (most attractive) to 10 (least attractive). It consists of 10 photographs of anterior teeth displaying varying degrees of malocclusion. Each student was asked to select the photograph that best represented the attractiveness of his or her dental appearance. This was used as a measure of their self-perceived dental esthetics. There was no time limit given to the subjects to study the photographs. The clinical examination (normative assessment) by the orthodontist (G.I.I.) was also carried out using this scale. The dental examinations and diagnostic criteria followed the World Health Organization’s recommendations for oral health surveys.²⁴

Two instruments were used to assess the OHRQoL of the students: the OHIP-14¹⁴ and the PIDAQ.¹⁵ Data on the OHIP-14 were collected through structured interviews. These were used to measure the impacts of oral problems, capturing an overall measure of functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. Questions were scored on a 5-point scale (4, very often; 3, fairly often; 2, occasionally; 1, hardly ever; and 0, never). The individual item responses were added together to generate an overall OHIP-14 score, with possible values ranging from 0 to 56.¹⁴

Data on the PIDAQ scales were obtained from the self-administered questionnaires. The PIDAQ is a 23-item psychometric instrument for assessment of orthodontic-specific aspects of quality of life, expressed in 4 domains: dental self-confidence (6 items), social

impact (8 items), psychological impact (6 items), and esthetic concerns (3 items). A 5-point Likert scale was used to rate how much dental esthetics exerted a positive or negative impact, ranging from 0 to 4 (0, not at all; 1, a little; 2, somewhat; 3, strongly; and 4, very strongly). An overall PIDAQ score for each domain was obtained by summing all item scores in the domain.¹⁵

Participants were categorized into groups based on their AC-IOTN scores. The AC-IOTN was collapsed from a 10-point scale to a 3-point scale. Photographs 1 to 4 represented no need for treatment; 5 to 7, borderline need for treatment; and 8 to 10 definite need for treatment on esthetic grounds.²³ The OHIP-14 was scored using the simple-count method and the sum OHIP-14. The simple-count method of the OHIP was done by counting the number of items to which a student responded “occasionally,” “fairly often,” and “often,” which were regarded as impacts, and “hardly ever” and “never” were regarded as no impact. On the other hand, the sum OHIP involved summing the numeric response codes (0, never; 1, hardly ever; 2, occasionally; 3, fairly often; and 4, very often) for all 14 items to produce a single summary score for a subject. A sum OHIP score of 14 or less indicated no impact, and 15 or more indicated an impact.²⁵

Two orthodontists (G.I.I. and another) were involved in determining the normatively assessed dental esthetics of the students. Thus, to assess for interexaminer reliability, both orthodontists independently examined 10 students using the AC-IOTN, before the study. A weighted kappa score of 0.7 was recorded, showing good agreement between the 2 examiners. Intraexaminer reliability values for both examiners were also recorded to give weighted kappa scores greater than 0.7.¹⁸ Furthermore, to assess intraexaminer reliability, 20 students were reinterviewed and reexamined 7 days after their first assessments.

Statistical analysis

Descriptive statistics were used for the students' age, perceptions of their dental esthetics compared with normative assessments, and the scores obtained for the different domains in the PIDAQ assessment. The Spearman rank correlation coefficient was used to compare the self-perceived with the normatively assessed dental esthetics. The Kruskal-Wallis test was used to test for the relationship between the PIDAQ subscale scores and the dental esthetics of the students. Chi-square and Fisher exact tests were also used to test for the associations between the OHIP-14 scores and the AC-IOTN of the students. The level of significance was set at $P < 0.05$.

Table I. Self-perceived dental esthetics and orthodontic treatment need of the students using the aesthetic component of the IOTN

Variable: AC-IOTN	Frequency		
	Male	Female	Total
No need for treatment	187 (93.5)	172 (98.3)	359 (95.7)
Moderate need for treatment	6 (3.0)	2 (1.1)	8 (2.1)
Definite need for treatment	7 (3.5)	1 (0.6)	8 (2.1)
Total	200 (100)	175 (100)	375 (100)

Values are n (%).

RESULTS

The final study sample included 375 subjects. Although 420 students were surveyed initially, data for 45 were incomplete, and thus those students were excluded from the final data analysis. Males made up 53.3% (200) of the sample, and females made up 46.7% (175). Their mean age was 21.16 ± 2.65 years. Only 2 students surveyed were currently receiving orthodontic treatment, and 3 other students had previously received orthodontic treatment. Thus, only 5 students (0.01%) had a current or previous history of orthodontic treatment.

In the self-rating of their dental esthetics and orthodontic treatment need, 359 (95.7%) of the students rated their dentition as esthetically acceptable (AC-IOTN grades 1-4) and thus requiring no need for orthodontic treatment; 8 (2.1%) students rated themselves as having moderately acceptable esthetics and thus in moderate need of orthodontic treatment; another 8 (2.1%) rated themselves as having poor dental esthetics and thus in definite need of treatment. There was no statistically significant sex difference ($P = 0.064$) in the self-perceived dental esthetics (Table I).

The normatively assessed dental esthetics showed that 324 students (86.4%) had esthetically acceptable teeth and no need for orthodontic treatment (AC-IOTN grades 1-4), 46 students (12.3%) had a moderate need for orthodontic treatment (AC-IOTN grades 5-7), and 5 students (1.3%) had poor dental esthetics (AC-IOTN grades 8-10) and a definite need for orthodontic treatment. The normative assessment showed a statistically significant difference ($P < 0.05$) between the dental esthetics for the male and female subjects (Table II).

A statistically significant association ($P = 0.000$) was observed between the self-perceived and normatively assessed dental esthetics of the students. The Spearman rank correlation coefficient showed a weak but significant correlation ($r = 0.325$; $P = 0.000$) between the 2 assessments. Three hundred twenty-four students were rated by the orthodontists as having acceptable dental

Table II. Normatively assessed dental esthetics and orthodontic treatment need of the students using the aesthetic component of the IOTN

Variable: AC-IOTN	Frequency		
	Male	Female	Total
No need for treatment	183 (91.5)	141 (80.6)	324 (86.4)
Moderate need for treatment	16 (8.0)	30 (17.1)	46 (12.3)
Definite need for treatment	1 (0.5)	4 (2.3)	5 (1.3)
Total	200 (100)	175 (100)	375 (100)

Values are n (%).

esthetics and no need for orthodontic treatment; of them, 315 students rated themselves likewise, whereas 46 students were rated by the orthodontists as having moderately acceptable dental esthetics and thus in moderate need of orthodontic treatment, but only 4 agreed. Of the 5 students who were normatively assessed to have poor dental esthetics and thus in definite need of orthodontic treatment, only 2 rated themselves likewise (Table III).

There was a statistically significant difference in the mean PIDAQ subscale scores of the students when analyzed according to their self-perceived dental esthetics using the AC-IOTN. This statistically significant difference ($P < 0.05$) was noticed for all 4 PIDAQ subscales of dental self-confidence, social impact, psychological impact, and aesthetic concern, with the greatest difference observed in the dental self-confidence subscale ($P < 0.000$). This finding implies that there was a statistically significant difference in the OHRQoL of the students using the PIDAQ scale, based on their self-perceived dental esthetics and orthodontic treatment need. The mean value for dental self-confidence gradually decreased with poorer dental esthetics and increased orthodontic treatment need (Table IV).

Furthermore, there was a statistically significant difference ($P < 0.05$) in the OHRQoL of the students across the 3 treatment need categories in the PIDAQ subscales of dental self-confidence, psychological impact, and aesthetic concern when analyzed based on their normatively assessed dental esthetics and orthodontic treatment need. However, this statistically significant difference was observed in only 3 of the 4 PIDAQ subscales, with the social impact subscale showing no statistically significant difference ($P > 0.05$) across the treatment need categories (Table V).

A statistically significant association was observed between the self-perceived dental esthetics of the students and all 14 daily activities listed in the OHIP-14, except for 2: "had a painful aching in the mouth" (physical pain) and "had an unsatisfactory diet" (physical

disability). Thus, the OHIP-14 domains of functional limitation, psychological discomfort, physical disability, psychological disability, social disability, and handicap were significantly associated with the self-perceived dental esthetics of the students, whereas parts of the domains of physical pain and physical disability showed no significant relationship. Strong significant associations were observed in the psychological discomfort, psychological disability, social disability, and handicap domains, but relatively weaker associations were observed in the functional limitation, physical pain, and handicap domains (Table VI).

There was a statistically significant association between the normatively assessed dental esthetics of the students and 8 of the 14 daily activities listed in the OHIP-14 scale. These were "had problems pronouncing words" and "felt sense of taste had worsened" (functional limitation), "painful aching in the mouth" (physical pain), "being self-conscious" and "feeling tense" (psychological discomfort), "had an unsatisfactory diet" (physical disability), "had been irritable with other people" (social disability), and "felt life in general was less satisfying" (handicap). Thus, the OHIP-14 domains of functional limitation, physical pain, psychological discomfort, physical disability, social disability, and handicap were significantly associated with the normatively assessed dental esthetics of the students. Conversely, the only unaffected domain was the psychological disability domain (Table VII).

DISCUSSION

The importance of evaluating OHRQoL among orthodontic patients relates to the impact of dental esthetics on social acceptance and self-concept. It has been shown that those with poor dental esthetics such as malocclusion can develop feelings of self-consciousness and shame about their dental condition; in addition, their body self-concept might be negatively affected by their facial appearance.²⁶ Thus, the knowledge of self-perception of malocclusion, the assessments of orthodontic treatment need (self-perceived and professional), and comparisons for any given population are vital issues in modern orthodontic practice.²⁷

Students with a current or previous history of orthodontic treatment were not excluded from this study. This was based on the findings from a previous study by Espeland and Stenvik,²⁸ who reported that there was no significant difference in the perceptions of occlusion between treated and untreated groups among young adults. However, the percentage of students with a current or previous history of orthodontic treatment was

Table III. Association between self-perceived and normatively assessed dental esthetics and orthodontic treatment need of the students according to the aesthetic component of the IOTN

Self-perceived dental esthetics	Professionally assessed dental esthetics				Fisher exact test	Spearman rank correlation coefficient
	No need	Moderate need	Definite need	Total		
No need	315 (84.0)	41 (10.9)	3 (0.8)	359 (95.1)		
Moderate need	4 (1.1)	4 (1.1)	0 (0.0)	8 (2.1)		
Definite need	5 (1.3)	1 (0.3)	2 (0.5)	8 (2.1)		
Total	324 (86.4)	46 (12.3)	5 (1.3)	375 (100.0)	0.0000	$r = 0.325, P = 0.000$

Values are n (%).

Table IV. Relationship between mean PIDAQ subscale scores and self-perceived dental esthetics and orthodontic treatment need of the students

PIDAQ subscale	AC-IOTN (self-perceived)			P value
	No need for treatment	Borderline need for treatment	Definite need for treatment	
Dental self-confidence	14.4 (6.1)	8.5 (5.4)	7.5 (4.8)	0.000*
Social impact	5.3 (6.2)	14.3 (13.3)	9.8 (8.1)	0.040*
Psychological impact	8.0 (5.5)	15.9 (5.0)	11.5 (5.0)	0.003*
Esthetic concern	1.51 (2.6)	5.1 (5.1)	3.5 (3.4)	0.006*

Values are mean (SD).

* $P < 0.05$, Kruskal-Wallis test.

Table V. Relationship between mean PIDAQ subscale scores and normatively assessed dental aesthetics and orthodontic treatment need of the students

PIDAQ subscale	AC-IOTN (normatively assessed)			P value
	No need for treatment	Borderline need for treatment	Definite need for treatment	
Dental self-confidence	14.7 (6.0)	10.7 (6.0)	8.8 (5.0)	0.000*
Social impact	5.4 (6.5)	6.8 (7.2)	6.8 (8.8)	0.305
Psychological impact	7.9 (5.6)	9.8 (6.2)	1.2 (3.4)	0.047*
Esthetic concern	1.5 (2.6)	2.8 (3.5)	2.6 (3.2)	0.003*

Values are mean (SD).

* $P < 0.05$, Kruskal-Wallis test.

low (0.01%) and thus of little or no significance, compared with the total number of students surveyed.

In this study, only 4.2% of the students perceived either a moderate or definite need for orthodontic treatment. This is closely related to that reported for a university student population in southwestern Nigeria (6%),²⁹ but less than that reported for a similar study of Peruvian university students³⁰ (12.8%). The differences

observed may be associated with cultural differences in what is deemed as an acceptable occlusion by different ethnic groups.¹⁹ On the other hand, the normative assessment of the students showed that 13.6% of them had a need for orthodontic treatment, with only 1.3% recording a definite need for treatment. This low definite need for orthodontic treatment is close to that reported for the Peruvian university student population of 1.8%.³⁰ The young adults in this study were less critical than the orthodontists in evaluations of their dental esthetics, and this finding has previously been reported.^{30,31} However, it highlights the fact that professional assessments are not always in tandem with patients' perceptions of dental esthetics.

Furthermore, although a statistically significant association was observed between the self-perceived dental esthetics of the students and their normatively assessed dental esthetics, the correlation between the 2 assessments was weak. This low level of correlation has also been recorded in other studies.²⁹⁻³² The significant but weak correlation observed in this study, in addition to the sex differences recorded for normatively assessed dental esthetics, reinforces the differences between clinicians' and patients' perspectives. This further highlights the importance of establishing the patient's perception of dental esthetics and considering this in orthodontic treatment planning.

Two OHRQoL scales, which have previously been validated and tested in our environment, were selected for use in this study.^{29,33} The PIDAQ scale, a condition-specific scale for assessing orthodontic aspects of quality of life, was chosen because it was specifically designed to assess the impact of dental esthetics on the psychosocial aspects of the quality of life of young adults,¹⁴ and the OHIP-14 is a generic scale for assessing the impact of oral health on daily activities and functions.¹⁵ Because our aim was to assess the relationship between dental esthetics and quality of life, the PIDAQ scale was considered an important tool for this study.

In this study, for the different categories of dental esthetics and orthodontic treatment need, the students

Table VI. Relationship between OHIP-14 scores and self-perceived dental esthetics and orthodontic treatment need of the students

<i>OHIP-14 daily activity</i>	<i>No need</i>	<i>Moderate need</i>	<i>Definite need</i>	<i>Fisher exact value</i>
Functional limitation				
1. Had problems pronouncing words				
-No impact	285 (79.4)	5 (62.5)	6 (75.0)	0.048*
-Impact	74 (20.6)	3 (37.5)	2 (25.0)	
2. Had worsened sense of taste				
-No impact	301 (83.8)	7 (87.5)	5 (62.5)	0.039*
-Impact	58 (16.2)	1 (12.5)	3 (37.5)	
Physical pain				
3. Had a painful aching in the mouth				
-No impact	168 (46.8)	3 (37.5)	4 (50.0)	0.067
-Impact	191 (53.2)	5 (62.5)	4 (50.0)	
4. Found it uncomfortable to eat any food				
-No impact	215 (59.9)	4 (50.0)	6 (75.0)	0.050
-Impact	144 (40.1)	4 (50.0)	2 (25.0)	
Psychological discomfort				
5. Have you been self-conscious?				
-No impact	207 (57.7)	3 (37.5)	0 (0.0)	0.000*
-Impact	152 (42.3)	5 (62.5)	8 (100.0)	
6. Felt tense				
-No Impact	281 (78.3)	2 (25.0)	4 (50.0)	0.000*
-Impact	78 (21.7)	6 (75.0)	4 (50.0)	
Physical disability				
7. Had an unsatisfactory diet				
-No impact	270 (75.2)	6 (75.0)	7 (87.5)	0.086
-Impact	89 (24.8)	2 (25.0)	1 (12.5)	
8. Had to interrupt meals				
-No impact	291 (81.1)	5 (62.5)	6 (75.0)	0.041*
-Impact	68 (18.9)	3 (37.5)	2 (25.0)	
Psychological disability				
9. Found it difficult to relax				
-No impact	306 (85.2)	5 (62.5)	6 (75.0)	0.021*
-Impact	53 (14.1)	3 (37.5)	2 (25.0)	
10. Had been a bit embarrassed				
-No impact	286 (79.7)	4 (50)	2 (25.0)	0.000*
-Impact	73 (20.3)	4 (50)	6 (75.0)	
Social disability				
11. Had been irritable with other people				
-No impact	271 (75.5)	4 (50.0)	5 (62.5)	0.018*
-Impact	88 (24.5)	4 (50.0)	3 (37.5)	
12. Had difficulty doing usual jobs				
-No impact	323 (92.5)	5 (62.5)	7 (87.5)	0.008*
-Impact	27 (7.5)	3 (37.5)	1 (12.5)	
Handicap				
13. Felt life in general is less satisfactory				
-No impact	269 (74.9)	5 (62.5)	5 (62.5)	0.046*
-Impact	90 (25.1)	3 (37.5)	3 (37.5)	
14. Had been totally unable to function				
-No impact	347 (96.7)	6 (75.0)	6 (75.0)	0.000*
-Impact	12 (3.3)	2 (25.0)	2 (25.0)	
Values are n (%).				
*P < 0.05				

Values are n (%).

* $P < 0.05$.

exhibited significantly different levels of dental self-confidence, psychological impact, and esthetic concern. However, for the social impact subscale, statistically significant differences were observed only for self-

perceived dental esthetics ($P = 0.040$), with no significant difference observed in this subscale for the normatively assessed dental esthetics ($P = 0.305$) of the students. Similar findings were reported for a white

Table VII. Relationship between OHIP-14 scores and normatively assessed dental esthetics and orthodontic treatment need of the students

<i>OHIP-14 daily activity</i>	<i>No need</i>	<i>Moderate need</i>	<i>Definite need</i>	<i>Fisher exact value</i>
Functional limitation				
1. Had problems pronouncing words				
-No impact	261 (80.6)	32 (69.6)	3 (60.0)	0.008*
-Impact	63 (19.4)	14 (30.4)	2 (40.0)	
2. Felt your sense of taste has worsened				
-No impact	272 (84.0)	38 (82.6)	3 (60.0)	0.026*
-Impact	52 (16.0)	8 (17.4)	2 (40.0)	
Physical pain				
3. Had a painful aching in the mouth				
-No impact	159 (49.1)	14 (30.4)	2 (40.0)	0.048*
-Impact	165 (50.9)	32 (69.6)	3 (60.0)	
4. Found it uncomfortable to eat any food				
-No impact	197 (60.8)	25 (54.3)	3 (60.0)	0.734
-Impact	127 (39.2)	21 (45.7)	2 (40.0)	
Psychological discomfort				
5. Have you been self-conscious?				
-No impact	189 (58.3)	21 (45.7)	0 (0.0)	0.008*
-Impact	135 (41.7)	25 (54.3)	5 (100.0)	
6. Felt tense				
-No Impact	253 (78.1)	32 (69.6)	2 (40.0)	0.098
-Impact	71 (21.9)	14 (30.4)	3 (60.0)	
Physical disability				
7. Had an unsatisfactory diet				
-No impact	246 (75.9)	36 (78.3)	1 (20.0)	0.002*
-Impact	78 (24.1)	10 (21.7)	4 (80.0)	
8. Had to interrupt meals				
-No impact	266 (82.1)	33 (71.1)	3 (60.0)	0.158
-Impact	58 (17.9)	13 (28.3)	2 (40.0)	
Psychological disability				
9. Found it difficult to relax				
-No impact	278 (85.8)	34 (73.9)	5 (100.0)	0.064
-Impact	46 (14.2)	12 (26.1)	0 (0.0)	
10. Have been a bit embarrassed				
-No impact	257 (79.3)	33 (71.7)	2 (40.0)	0.096
-Impact	67 (20.7)	13 (28.3)	3 (60.0)	
Social disability				
11. Have been irritable with other people				
-No impact	249 (76.9)	28 (60.9)	3 (60.0)	0.038*
-Impact	75 (23.1)	18 (39.1)	2 (40.0)	
12. Have difficulty doing usual jobs				
-No impact	298 (92.0)	42 (91.3)	4 (80.0)	0.061
-Impact	26 (8.0)	4 (8.7)	1 (20.0)	
Handicap				
13. Felt life in general is less satisfying				
-No impact	247 (76.2)	31 (67.4)	1 (20.0)	0.000*
-Impact	77 (23.8)	15 (32.6)	4 (80.0)	
14. Have been totally unable to function				
-No impact	311 (96.0)	43 (93.5)	5 (100.0)	0.611
-Impact	13 (4.0)	3 (6.5)	0 (0.0)	
Values are n (%).				
*P < 0.05.				

Values are n (%).

* $P < 0.05$.

young adult population.¹⁵ The social impact subscale includes items referring to potential problems in social situations caused by subjective perceptions of an unfavorable personal dental appearance.¹⁵ Our finding

in which the social impact subscale recorded a statistically significant difference for self-perceived but not normatively assessed dental esthetics, reinforces 2 important points previously reported. The first point is

the difference between professional evaluations and patients' perceptions of malocclusion, and the second is that poor dental esthetics may impair social functioning, which has been reported in several other studies.^{11,13,29,34} However, the fact that the social impact domain recorded the least significant difference ($P = 0.04$) of all 4 PIDAQ subscales for the self-perceived dental esthetics of the students implies that the social impact of their dental esthetics on their OHRQoL was relatively less significant, when compared with the dental self-confidence, esthetic concern, and psychological impact of their dental esthetics.

Dental self-confidence was the most affected domain in the PIDAQ subscales for both self-perceived and normatively assessed dental esthetics ($P < 0.000$). Similar findings have also been reported in closely related studies.^{15,29} Dental self-confidence indicates the level of satisfaction or dissatisfaction with the appearance of one's dentition and aims to measure the influence of dental esthetics on a person's self-image.¹⁵ Those who are aware of their malocclusion may focus increasingly on it and may even develop anxieties. It is also possible for them to exhibit increased private self-consciousness that may predispose to self-criticism and dissatisfaction manifesting as low dental self-confidence.^{20,29,35} Furthermore, our results suggest a trend of decreasing dental self-confidence with increasing levels of altered dental esthetics (poorer dental esthetics), as perceived by both the students and the orthodontists. This has also been reported in previous studies, corroborating the fact that well-aligned teeth may be associated with greater satisfaction regarding dental attractiveness, resulting in a better self-concept.^{15,21,29}

With respect to the OHIP-14 scale, whereas all 7 domains (including 12 daily activities) were significantly associated with the self-perceived dental esthetics of the students, only 6 domains (including 8 daily activities) recorded a significant association with the students' normatively assessed dental esthetics. The results recorded for the association between the dental esthetics and the physical pain and physical disability domains of the OHIP-14 measure were a direct contrast, when comparing the self-perceived with the normatively assessed dental esthetics. This finding implies that clinicians are more likely to associate poor dental esthetics or malocclusion with painful aching in the mouth than are young adult patients. Similar studies, based on only a normative assessment of dental esthetics, have also reported a significant association with dental pain.^{17,18} Previous studies have reported that malocclusion may result in oral pain: eg, retroclined maxillary incisors may traumatize their labial gingivae.³⁶ In addition, malocclusions may cause oral

pain indirectly via temporomandibular disorders³⁷ or increase the likelihood of traumatic injuries from proclined maxillary central incisors.^{17,38}

Conversely, our findings also show that young adults are more likely to associate their poor dental esthetics or malocclusions with "finding it uncomfortable to eat any food" or "having to interrupt their meals" compared with the normative assessment by the clinician. This may be because mastication is a personal experience, and young adult patients are better able to tell than the clinician when their malocclusion negatively affects their masticatory efficiency. Previous studies have reported that patients with malocclusion have reduced masticatory efficiency, when compared with those with normal occlusion.³⁹⁻⁴¹ However, only a borderline significance ($P = 0.05$) was recorded between the self-perceived dental esthetics and "finding it uncomfortable to eat any food," whereas the association between self-perceived esthetics and meal interruption, although significant, was also not strong ($P = 0.04$). These associations were much weaker than those recorded for the psychological discomfort, psychological disability, and social disability subscales. These findings reinforce the report by Daniels and Richmond⁴² that technical aspects of malocclusion such as dissatisfaction with the ability to chew are less likely to impact quality of life among young adults than the more subjective aspects of dental esthetics and the self-perceptions of dental appearance.

It is also instructive that the psychological disability domain (which includes "finding it difficult to relax" and "being a bit embarrassed") recorded a statistically significant association with the self-perceived dental esthetics of the students, but not with their normatively assessed dental esthetics. These differences in the OHIP associations between self-assessed and normatively assessed dental esthetics further reinforce that professional evaluations of malocclusion do not always coincide with patients' perceptions.^{29,30,32,34}

Under the psychological discomfort domain, "self-consciousness" was significantly associated with both self-perceived and normatively assessed dental esthetics of the students. These findings agree with previous studies reporting that young adults with more severe forms of malocclusion had higher self-consciousness scores.^{17,18} The psychological discomfort domain recorded the strongest association between the students' self-perceived dental esthetics and their OHRQoL. These findings also coincide with other studies that have reported that most patients who need orthodontic therapy feel shameful and inferior, and the higher the need for treatment, the greater the person's embarrassment.^{43,44}

Our findings that young adults with relatively poor dental esthetics and high orthodontic treatment need

tend to be more socially deprived than those with relatively good dental esthetics and low treatment need have previously been reported in several cross-sectional and retrospective studies.^{17,18,29,44} This explains the impact of poor dental esthetics on the social well-being of young adults.

This study also had some limitations. The young adults were university undergraduates and do not represent the entire youth population of the country, which includes a large proportion of people with lower levels of education. Thus, these results cannot be extrapolated to the entire young adult population of Nigeria, because studies have shown that the sociodemographic characteristics of the subjects can affect their OHRQoL.¹¹ As a follow-up to this, it would be interesting to compare the findings of similar studies in young adult populations of other racial groups. In addition, the relevance of extrapolating these findings to older adult populations is limited. This is because the importance of physical attractiveness in young adults, many of whom are developing and testing sexual partnerships, appears obvious, whereas for older people and their social interactions, dental esthetics are likely to be less important.¹⁸

Our findings reinforce the fact that the most significant impact of quality of life expresses itself in the psychosocial domains rather than in dissatisfaction with function. These findings also show that considering the impact of dental esthetics on the quality of life of patients would be of great benefit in screening patients who desire orthodontic treatment where access to care is limited. This is particularly relevant when specific criteria must be developed to determine which young adults qualify for medically necessary orthodontic treatment. Additional OHRQoL information acquired from the patient would enhance normative orthodontic treatment need assessments, thus supporting the use of a sociodental approach to orthodontic treatment planning in young adult populations. This approach has been successfully validated and used for children, and our findings suggest that it may successfully be used in young adult populations. This study is expected to serve as a preliminary investigation, and it is hoped that the findings will be of benefit in planning orthodontic health care services for young adult populations.

CONCLUSIONS

These results indicate that dental esthetics has a greater impact on psychological status than do the oral, physical, and functional statuses of the OHRQoL of the students. In addition, this study shows that there are significant differences between the impacts of self-perceived and normatively assessed dental esthetics on

the OHRQoL of young adults. These differences emphasize the importance of patient-centered evaluations, particularly with respect to dental esthetics and OHRQoL for orthodontic treatment planning for young adults.

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