A THREEFOLD CORD THAT IS NOT QUICKLY BROKEN: THE KINSHIP OF THE FACE, THE TEETH AND QUALITY OF LIFE

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By

Kikelomo Adebanke Kolawole
Professor of Orthodontics

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PREAMBLE

I don't know about tomorrow
I just live from day to day
I don't borrow from its sunshine
For its skies may turn to gray
I don't worry o'er the future
For I know what Jesus said
And today I'll walk beside Him
For He knows what is ahead

Chorus
Many things about tomorrow
I don't seem to understand
But I know who holds tomorrow
and I know who holds my hand (Ira F. Stanphil 1950)

The Vice Chancellor, Principal Officers of the University, Members of the University Governing Council, Distinguished Members of Senate, Provosts, Deans, Directors, Heads of Departments, Invited Guests, Gentlemen of the Press, Distinguished Ladies and Gentlemen.

It is with great joy and gratitude to God that I stand here this day to deliver the 398th Inaugural Lecture of this great citadel of learning, Obafemi Awolowo University (OAU), Ile-Ife. I acknowledge that I am a recipient of the uncommon grace and mercies of the Lord. If I may join the battle of firsts, I will say it is a privilege to deliver the first Inaugural Lecture by an Alumnus Orthodontist, of the Obafemi Awolowo University, Ile-Ife.

Like the Psalmist said, *O bless our God, ye people, and make the voice of his praise to be heard: Which holdeth our soul in life, and suffereth not our feet to be moved (Psalms 66:8-9, KJV).* I could never have imagined that I would one day work as an academic or live in this ancient city of Ile-Ife. But God who knows the end

from the beginning and directs the path of a man, brought me here by divine appointment.

I was born at the University College Hospital Ibadan, I attended Omoleye Children's School, 200, Ikorodu Road, Palmgrove and Ilupeju Primary School, Town Planning Way Ilupeju, Lagos. I proceeded to the Federal Government Girls College (FGGC) Sagamu on October 16, 1982, as the first set of the 6-3-3-4 system of secondary school education in Nigeria.

The Choice of Obafemi Awolowo University

At the end of my tough yet interesting six-year sojourn in secondary school, I had two decisions to make, the choice of a course of study and the university of study. At this time, I was bent on heading back to Lagos to attend the University of Lagos. However, my plans could not materialise, because by the 7th of May 1988 when I wrote the JAMB Examinations, I was still 14 years old and had to make the choice of attending Obafemi Awolowo University.

I was also strongly persuaded to pick Obafemi Awolowo University by my father. His arguments in favour of OAU were the conducive female accommodation and the OAU dam that provided running water all the year round. I consented to attend OAU reluctantly. Here was I, a young teenager, many things about tomorrow I did not seem to understand, but I knew the One who holds tomorrow, and He was present with me holding my hand.

I had my earliest encounters with Obafemi Awolowo University, Ile-Ife in the late 1970s, during visits to my mother's best friend Attending this institution was more than an academic choice, it was homecoming. My father was an alumnus of the Faculty of Pharmacy, OAU (1968 set), my mother also obtained a BSc Social Sciences (Economics) from the Faculty of Social Sciences in 1970. I had heard lots of stories about their times here. So, I stand here today as a daughter of two alumni, the wife of one, the senior sister of one and mother of a prospective alumnus, Ayokunmi Temitope.

My younger brother Ayotunde, later followed in my footsteps and studied Medicine here, graduating at the top of his class in 2001.

The Choice of Dentistry

My next dilemma was the choice of the course of study. I probably belong to the minority who picked Dentistry as a course of first choice. Dr. Adenola Ayorinde (of blessed memory), a secondary school classmate whose dad was a physician had muted the idea of studying Dentistry. According to her, life was going to be easier as a dentist. I never gave her opinion a thought until I started considering alternatives to medicine. Pharmacy was a familiar terrain with a pharmacist father and an older sister who had been admitted to study Pharmacy at the University of Lagos the previous year, so I opted for Pharmacy. My dad reluctantly consented but while he was away from home, I told my mum about my consideration of Dentistry. My Dad encouraged me to pursue a degree in Dentistry. He felt my recurrent visits to the dentist must have stimulated my interest in Dentistry.

One day in 1980, I had attempted to sink a "post" in a tooth in my mouth by myself. Childhood mischief had made me pick up a screw from the floor in my classroom, which I inserted upside down, into a big carious cavity in my mouth. Curiosity also made me try it right side down and there it got stuck! After several attempts to bring it out were unsuccessful, I burst into tears and had to be taken to the office of the headmistress. After reading a letter sent by the school through the driver, my disciplinarian father asked me to wait for my mother who had gone to work at Agege to return home to Obanikoro, while he returned to his office at Town Planning Way a few blocks from the location of the dental clinic. That was the beginning of our numerous evening visits to the dentist. On another occasion, I had tried to bring out the nut inside the cashew fruit nut with my teeth. My lips and mouth got burnt and I worsened the burns by smearing it with toothpaste.

I only recently got to know through Dr. Chukwuma Emeka who bought the practice that the name of the now elderly dentist is Dr.

Edmund Oluwaseun Solarin, he owned Solly Dental Clinic at 1, Afolabi Lesi Street, off Town Planning Way Ilupeju Lagos. Dr Solarin had a characteristic way of saying "open" which I never forgot, and I was so glad to re-establish contact with him last February. Here is his response to my message *"Good morning, Professor and thank you for your kind text. May I congratulate you on your appointment and wish you all the best when you deliver your inaugural lecture. It remains my pride and joy that I taught the first Professor of Orthodontics, Michael Isiekwe - he sent me new month greetings over the weekend- and I am very much in touch with him. Here's wishing you a great and successful academic career at OAU. Warm regards and thanks again for your kind text."*

I cannot count the number of persuasions I got to change my mind about Dentistry, but I am glad I stood firm with my decision and the rest, as they say, is history. God in His infinite wisdom had clarified the worth of the human tooth which is just one of the many structures we deal with in Dentistry. So valuable was it that God gave each one the worth of the human eye.

Exodus 21:24-27 KJV

24. Eye for eye, tooth for tooth, hand for hand, foot for foot,
25. Burning for burning, wound for wound, stripe for stripe.
26. And if a man smite the eye of his servant, or the eye of his maid, that it perish; he shall let him go free for his eye's sake.
27. And if he smite out his manservant's tooth, or his maidservant's tooth; he shall let him go free for his tooth's sake."

Orthodontics as a Choice of Specialty

Towards the end of my undergraduate training while rotating through medicine posting, I met a young man succeeded in persuading me to undertake my one-year housemanship here in Ile-Ife instead of Lagos. I graduated at the top of my class in January 1996 instead of 1994, no thanks to strikes, I was therefore retained for Housemanship on merit. I received the Aubrey Sheiham Prize

in Community Dentistry, Pa Fagade Prize in Periodontology and the Fox-Taylor Prize in Oral and Maxillofacial Surgery, but my choice of Specialty was Orthodontics.

My first encounter with orthodontic appliances was with a roommate at FGGC Sagamu. She had commenced orthodontic treatment with the famous then Dr. Isiekwe in Lagos. My friend and classmate Dr. Funke Olaniyan (nee Adepoju) had mentioned that she would specialise in Orthodontics even before we left secondary school, probably because of her interactions with another classmate Dr. Tolu Olatunji (nee Osinubi) who wore braces. So even before gaining admission, I had started to consider Orthodontics as a specialty.

When I started clinical postings in Dentistry, there was no Orthodontist on ground and almost everyone was training to become an Oral and Maxillofacial Surgeon. However, Prof. Otuyemi returned after his training in the United Kingdom. My class was the first set he taught that had all year-round lectures in Orthodontics rather than block lectures which sealed my desire for Orthodontics.

I completed my residency training and obtained the Fellowship of the West African College of Surgeons in 2005, I also obtained an MSc in Psychology from OAU in 2017, more recently in 2023, I was awarded the Doctor of Medicine (MD) degree of the National Postgraduate Medical College of Nigeria. I joined the services of Obafemi Awolowo University in August 2005 as Lecturer I and was promoted to the rank of Professor on October 1, 2017. It therefore behoves me with a deep sense of duty and honour to present my contributions to knowledge through this inaugural lecture in defence of the pronouncement of this esteemed University.

What is an inaugural lecture? I had planned to omit the definition of an inaugural lecture to avoid repetition, as many previous inaugural lectures have addressed this, but as I posted the notice

for today's lecture on social media, a response I got was "wait o, are you retiring be that? Haaaa so fast?" This has therefore necessitated clarifying what an inaugural lecture is again today. An Inaugural Lecture is a formal public presentation given by a newly appointed Full Professor to mark the beginning of their tenure in that position. It is both a ceremonial and academic event, often hosted by a University or Faculty to celebrate the individual's promotion and contributions to their field. It is a way for the new professor to showcase expertise and introduce their academic journey, research interests, and scholarly contributions to colleagues, students, and the public.

Defining Orthodontics and an Orthodontist

The scope of Dentistry is often unappreciated by many who think of it as only being about the set of 32 adult teeth. Dentistry is a broad discipline with several specialties. My postgraduate training was in Orthodontics, the formal name of the specialty is Orthodontics and Dentofacial Orthopedics. It is the area of dentistry concerned with the diagnosis, supervision, guidance and correction of malocclusions. Dentofacial orthopedics focuses on guiding the growth of the face and jaws, how the bones and tissues of the face work together, and how they impact function and appearance.

An orthodontist is a dental professional who has pursued advanced specialised training to become an expert in diagnosing and treating dental and facial irregularities. The journey to becoming an orthodontist is a challenging yet rewarding one that requires concentrating exclusively on the field of orthodontic care.

What is Malocclusion?

Simply defined, malocclusion is the irregularity of teeth or malrelationship of the dental arches beyond the accepted range of normal. They are variations from the normal and represent biological variability.

Figure 1: Some clinical presentations of malocclusion

This raises an important question, why the concern about the arrangement of teeth and dentofacial appearance? Malocclusions are one of the major oral health problems ranked in third place worldwide by the WHO, following dental caries and periodontal disease (Alhammadi et al., 2018). It is a global public health problem, nearly everyone in this auditorium likely has at least one tooth that is out of place, rotated, crowded or spaced.

The World Health Organisation (WHO) defines oral health as a state of being free from mouth and facial pain, oral diseases and disorders that limit an individual's capacity in biting, chewing, smiling, speaking and psychosocial well-being. Oral health is essential to general health and well-being and greatly influences quality of life. The role of the orthodontist is crucial in helping individuals achieve better oral health through orthodontic treatment.

Malocclusion has a strong genetic component in addition to environmental influences. While genetics lays the foundation, environmental influences such as pressure and forces related to physiological activity, masticatory function, respiratory pattern, and oral habits significantly modify, worsen, or even initiate malocclusion.

While malocclusion is not classified as a disease but rather as different levels of deviations from optimal occlusion, it is not merely a cosmetic issue. The presence of malocclusion can have significant handicapping effects on daily life influencing physical, social and psychological wellbeing and in many countries, the treatment is included in public oral health care programmes (Närhi et al., 2022). The importance of well aligned teeth is also documented in Song of Songs 4:2 (KJV) “Thy teeth are like a flock of sheep that are even shorn, which came up from the washing; whereof every one bear twins, and none is barren among them”.

Historically, Edward Angle, regarded as the father of modern orthodontics, also focused on maintaining all 32 teeth in ideal occlusion. However, the paradigm shift from Angle's dogmatic emphasis on ideal dental occlusion and skeletal relationship to considering intraoral and facial soft tissues has since made dento-facial aesthetics a paramount goal of orthodontic treatment thus enhancing quality of life (Shetty et al., 2021).

Oral Health Implications of Malocclusion

Traditionally the consequences of malocclusion are regarded as psychosocial, functional, and dental related. Malocclusion impacts appearance, self-esteem, confidence, and social interactions in individuals. Traits such as crowding, reverse overjet and open bite cause disturbances of oral function, such as mastication, swallowing, breathing and speech. Increased overjet heightens susceptibility to traumatic dental injuries, while crowding predisposes to the development of dental caries and periodontal diseases (Hope et al., 2020).

Malocclusion has also been linked to broader health issues, including headaches, nutrition, gastrointestinal problems, and even systemic health concerns. Despite the high prevalence of malocclusion, its potential health risks are often underestimated, with many individuals not seeking orthodontic treatment until functional or aesthetic concerns become severe.

The Kinship of the Face, Teeth, and Quality of Life

Mr Vice Chancellor Sir, the term kinship typically refers to the social bonds and relationships that connect individuals through blood (biological ties), marriage, or adoption. It can be classified into consanguineal (blood relations) affinal (marriage relations) and fictive kinship (no direct biological or legal connection). In the context of this Lecture, it signifies the inseparable relationship between facial aesthetics, dental health and overall well-being. It is this deep interconnection between the face, the teeth, and quality of life that has inspired the title of today's lecture: **"A Threefold cord that is not quickly broken: the kinship of the face, the teeth and quality of life".** "…A threefold cord that is not quickly broken" is a quotation taken from the Holy scriptures, found in Ecclesiastes 4:12 (KJV).

Figure 2: A Threefold cord that is not quickly broken: the face, the teeth and quality of life

For the past few years, my research has focused on perceptions of facial and dental aesthetics, malocclusion and Oral Health Related Quality of Life (OHRQoL), the relationship between craniofacial form and function and the association between oral habits, oral health and overall well-being. More recently, I have been collaborating with colleagues in Medicine and other specialties of Dentistry on sleep medicine research. Today, in the short time allotted to me, I will present my humble contributions to the knowledge and practice of orthodontics.

This lecture will explore:

1. The psychosocial and aesthetic implications of dental and facial variations.

2. The oral health consequences of malocclusion.
3. The biological and functional aspects of malocclusion.
4. The broader health consequences of malocclusion and the need for multidisciplinary approaches in healthcare.

The Psychosocial Impact of Malocclusion

Malocclusion can affect the physical, psychological functioning and social development of an individual collectively known as oral health related quality of life (Sehrawat et al., 2022). Research has recognized poor self-esteem and an unfavourable social response as the two interrelated ways by which unacceptable occlusal traits operate against the psychological well-being of individuals (Ellakany et al., 2021).

Impact of Malocclusion on Self-Esteem

Self-esteem refers to an individual's feelings and thoughts about personal worth, competence and suitability, which results in positive or negative evaluations and attitude towards oneself (Puneet et al., 2017). The human face plays a crucial role in the development of self-image and self-esteem, with minor variations in tooth position being significant determinants of the overall aesthetic impression of a face.

Individuals with malocclusion can develop feelings of self-consciousness and shame, may be shy in social contexts and may also report significantly lower self-esteem (Militi et al., 2021). However, people who are satisfied with their teeth and faces appearance tend to exhibit higher self-confidence and self-esteem. Dissatisfaction with dental appearance is worse when the irregularity is severe or visible and easily assessed by the lay man (Foster Page et al., 2013).

Self-esteem is a predictor of favourable life outcomes, with implications in areas such as interpersonal relationships and academic performance. Therefore, dentofacial anomalies which can negatively impact an individual's self-esteem warrant attention and consideration.

Unfavourable Social Response to Malocclusion

The appearance of the face and teeth significantly affects an individual's social interactions and relationships (Tristao et al., 2020). Dental appearance is particularly important for social interactions because there is a need to smile in numerous courtesies and revealing of teeth is probably inevitable during conversations. If a malocclusion is highly visible, it can evoke aversion, thereby interfering with social interactions.

The unfavourable social response, which malocclusion may evoke, may occur insidiously as bias in the attitudes of others during a range of social encounters or blatantly manifest as teasing, nicknames, name-calling, ridicule, bullying, discrimination, or stigmatisation particularly during childhood and adolescence. (Bauss & Vassis, 2023).

As many orthodontic patients are in the preadolescence and adolescence stages, and under a great effect of peer and surrounding environment pressure, the knowledge of various aspects of child and adult psychology is mandatory for a good orthodontist and patient interaction (Sehrawat et al., 2022).

My Introduction to Research

My earliest research works were not directly related to orthodontics, as Prof. Eyitope Ogunbodede was the first to introduce me to research. He had invited me along with all the House Officers in my set to participate in his research works, I was therefore assigned to visit the medical outpatient clinic once every week to collect data for this purpose. We investigated the oral health of adult diabetic patients at the Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Nigeria, with non-diabetics serving as controls (Ogunbodede et al., 2005). We did not only demonstrate the most prevalent oral lesions, but we also showed perhaps for the first time in indigenous Nigerians the link between glycaemic control and oral manifestations of diabetes. Diabetics showed significantly more hyposalivation, however no difference was observed in altered taste sensation, burning mouth

sensation, angular cheilitis, glossitis, and stomatitis status of the two groups. Our findings suggest that with adequate metabolic control, the oral health status of a diabetic may not differ significantly from that of a non-diabetic except for xerostomia.

My very first publication was however with Prof. Vincent Ugboko of blessed memory (Ugboko et al., 2003). We investigated posttraumatic nerve injuries among 337 patients treated for orofacial injuries. Posttraumatic nerve injuries occurred in 16.6% of our sample with road traffic accidents accounting for the majority (76.8%). Lesions of the inferior alveolar nerve (39.3%), infra orbital nerve (39.3%) facial nerve lesions (19.6%) occurred due to mandibular, zygomatic bone and Le Fort fractures and soft tissue lacerations respectively. A significant percentage (33.3%) had persistent nerve damage after re-evaluation 12 months postoperatively. Our results highlighted the importance of posttraumatic orofacial nerve injury evaluation, diagnosis, and documentation prior to patient management.

THE PSYCHOSOCIAL AND AESTHETIC IMPLICATIONS OF DENTAL AND FACIAL VARIATIONS

Perception of Dental Aesthetics and Orthodontic Treatment Need

I was privileged to be the very first Resident trained by Prof. Olayinka Donald Otuyemi after his return from the United Kingdom and this earned me the nickname “Crown Princess”. While I was a Resident in training, Prof. Otuyemi gave me the task of writing a full manuscript which was on perception of dental aesthetics and the need for orthodontic treatment. I remember clearly that my husband taught me how to enter the data into SPSS, analyse the data and write up the work.

One of the major reasons for seeking orthodontic treatment is dissatisfaction with dental aesthetics (Feldens et al., 2015b) yet perception of dental appearance is rather complex and subjective as there are differences in the recognition and evaluation of dental features. Perceptual errors have been demonstrated in both

directions, while some individuals with marked deviation show minimal concern and underestimate the severity of their malocclusion, others with slight defects express great concern, and dissatisfaction with objectively good occlusion (Gao, 2024).

The perception of deviations from normal occlusion plays a crucial role in motivating individuals to seek orthodontic treatment. Understanding a patient's perception is also essential because it may influence expectations of treatment and treatment outcomes. To establish a treatment plan and for realistic treatment expectations, orthodontic problems must be addressed in a way that is comprehensible to patients and parents. Traditionally, orthodontic patients were children or adolescents, (Sehrawat et al., 2022), which appears to be the reason for the marriage between Orthodontics and Paediatric Dentistry in the Department of Child Dental Health in many Institutions. Parents therefore play a crucial role in initiating treatment, providing consent, financing treatment, and ensuring compliance.

Orthodontic treatment need is the degree to which an individual requires procedures to improve dental and skeletal irregularities because of malocclusion features (Bellot-Arcis, 2012). Orthodontists and laypersons (patients/parents) often differ in their assessment. Discrepancies in perception of orthodontic treatment need arise due to personal values, knowledge, and social influences. Variations may also be due to differences in age, gender, and personality (Eliakim-Ikechukwu et al., 2013).

We therefore investigated perceptions of 100 consecutive clinic patients, and their accompanying parents of dental appearance and compared their opinions with the treatment need registered by orthodontists using the Index of Orthodontic Treatment Need (IOTN) (Otuyemi & Kolawole, 2005). The Aesthetic Component (AC) of the IOTN consists of a scale of 10 colour photographs showing different levels of dental attractiveness, grade 1 representing the most attractive and grade 10, the least attractive occlusion. Photographs 1-4 represent "No need for treatment"; 5-7,

Borderline need for treatment" and 8-10 represent "Need for treatment". It has the potential to indicate a person's perception of dental aesthetics better than questions alone can reveal.

Figure 3: Aesthetic Component (AC) Scale of IOTN

Our results showed that the parents were more objective and had the strongest correlations with the orthodontist (r = 0.791) while the least was between the patients and the orthodontists (r = 0.653). We also found that about one-half of the patients were in the definite need for orthodontic treatment category. We corroborated previous observations that many individuals underestimate the severity of their malocclusion, as patients and parents' ratings fell within the more attractive range of the AC scale of the IOTN.

Towards the award of the Fellowship of the West African College of Surgeons, I investigated the Orthodontic concern and treatment awareness in 11 to 14-year-old Nigerian children and their parents compared with objective treatment need (Kolawole, 2004). That was the beginning of my pursuit in the study of psychosocial impact of malocclusion.

The highlights of the study were that the face and teeth were entities that participants tried to separate, facial and dental appearances were assessed independent of each other. Irrespective of the dental arrangement, the facial appearance was adjudged good. Participants also unanimously rated the children's dental appearance better than their peers. This observation may not be

unrelated to the cultural and religious beliefs in our environment that all things are God created and should be accepted as beautiful and flawless. The school children expressed greater orthodontic concern than their parents. The extent to which the financial implications of orthodontic treatment influenced the parents' opinion in this group is uncertain. Our observations in the referred population however support previous findings that parents are usually more motivated for orthodontic treatment than their children. We also found perhaps for the first time in Nigeria that ectopic maxillary canines are probably the most common driving factor among the referred populations. We observed at this time that there was also a problem with the acceptance of braces in the Ile-Ife environment, probably because exposure to and familiarity with orthodontic appliances was low (Kolawole et al., 2008a).

The normative and perceived orthodontic treatment need of the two populations were also determined (Kolawole et al., 2008b). We found that 7.2% of school children and 43.9% of the referred population were in definite need of orthodontic treatment based on the Aesthetic Component of IOTN. The Dental Health Component (DHC) determined 14% and 63% as having great need for treatment in the school and referred populations respectively, while the Dental Aesthetic Index (DAI) showed that about two-thirds (66%) of the children in the referred population had dental appearance varying from severe to very severe malocclusion, while less than a third (20.5%) of the children in the school population were in these groups. Subjective and professional assessment of orthodontic treatment need were found to be different. Patients' and parents' concerns did not coincide with professional evaluation of treatment need.

Evaluation of the perception of dental aesthetics with the IOTN is not without its limitations. Although the photograph chosen on the AC Scale of the IOTN is supposed to give an indication of orthodontic treatment need in terms of aesthetic impairment, participants find the concept of difficult to grasp, and constantly attempt to match their dentition with the photographs. The AC of

IOTN may also be criticized for providing only a two-dimensional guide and insufficient wide range of dental appearance. We therefore evaluated the self-perception of dental aesthetics and orthodontic treatment need among first year university undergraduates. We employed the Oral Aesthetic Subjective Impact Scale (OASIS) which is based on a Likert scale that is thought to place few cognitive demands on the respondent and a Visual Analogue Scale (VAS), with 0 being the worst possible and 100 being the most ideal aesthetics. It was observed that the mean OASIS scores of participants increased as the need for treatment was greater while the mean VAS score decreased. Similar to the pattern of response with the AC of IOTN, participants displayed an aversion for the unattractive end of the VAS (Kolawole et al., 2012). Our findings revealed that the OASIS and VAS were able to discriminate between participants with different degrees of treatment need, they are therefore valid tools for evaluation in prospective orthodontic patients.

Table 1: Distribution of OASIS and VAS scores according to AC scale of IOTN categories

AC Categories	Scale	Mean	SD
No need for treatment	OASIS	12.93	5.45
	VAS	78.29	17.25
Borderline need for treatment	OASIS	15.36	7.25
	VAS	66.75	15.37
Great need for treatment	OASIS	21.55	6.12
	VAS	48.14	11.84

Nickname and Bullying in Relation to Dental Appearance

Research has shown that aesthetically handicapping features of malocclusion may make individuals more susceptible to nicknames, and bullying (Tristao et al., 2020). Nicknames are informal, often humorous names given to individuals which may relate to real names, personality, appearance, or actions. Bullying is a practice of aggressive behaviour or intentional harm to which an individual is repeatedly (Albitar et al., 2013). Undesirable

nicknames and bullying could have a negative effect on self-esteem and quality of life and may be motivating factors to seek orthodontic treatment (Bauss & Vassis, 2023).

We therefore assessed the incidence of nicknames and name-calling among a sample of 506 randomly selected Nigerian school children, the relationship of the nicknames to dental appearance and the impact on the children (Kolawole et al., 2009). Our paper was the first attempt to determine the impact of nicknames on the psychological well-being of Nigerian adolescents. It was obvious from this study that being given nicknames is a common occurrence in Nigerian schools, with three out of every four children being nicknamed at school (77%). Most of the nicknames were derived from the children's names (34.9%), while others were related to appearance (32.6%), personality, public figures, food, animals, and religious inclinations. Appearance-related nicknames were most often related to the weight (26.8%), height (21.2%) and head (19.7%). Teeth were the source of nickname in only 6 of the children (4.7%) with equal gender occurrence.

More recently in 2023 with the rise in internet and social media use, the prevalence of nicknames name-calling and bullying in relation to dental appearance among school children was investigated under my supervision (Awosoji, 2023). The majority (65.9%) of children had nicknames which were predominantly used at school (70.6%). However, only a small fraction (5.3%) was due to dental appearance. Bullying was also a common occurrence (53.1%) with verbal bullying being the most prevalent form (75.9%), and bullying experience most common among males as previously reported. Orthodontic treatment need (IOTN) differed significantly between participants with and without nicknames but not between bullied and non-bullied participants. Our study prevalence of bullying was higher than previous Nigerian reports (Chikaodi et al., 2017), and the UNESCO report of one in three students bullied by their peers at school (UNESCO, 2019) and this may be an alarm that bullying occurrence is on the rise.

Social Judgments made by Children in Relation to Dental Appearance

Research continues to confirm that children and adults make social judgments based on physical appearance (Trujillo & Anderson, 2023). To determine the social judgments made by children of their peers based on dental appearance, we got 200 secondary school students aged 12-15 years to rate the personality of five adolescents from frontal face photographs showing normal occlusion and various classes of malocclusion presented in random order (Aladetohun & Kolawole, 2019). A previously validated questionnaire containing six positive and three negative attributes, namely clever, kind, honest, confident, careful, helpful, rude, stupid, and naughty was used. Attributes were rated on a four-point Likert scale, with scores for negative attributes reversed before summation to obtain the total attribute score for each photograph. A low score represented a positively viewed subject.

Figure 4: Photographs showing various classes of malocclusion presented in random order

We found that the adolescent with class I malocclusion was the most positively judged, while the adolescent with Class II division 1 malocclusion most negatively judged. No significant gender differences were observed with the ratings of the occlusions; however, we found the 15-year-olds to be significantly more

critical of the photographs. Participants in the high socio-economic class gave the most positive judgments which was significantly different from others and progressively worsened as the socio-economic class became lower. Our findings support previous research indicating that facial and dental appearance significantly influences social judgments, as adolescents with visible dental differences incurred negative social judgements. While positive and negative attributes such as clever, kind, honest, confident, careful, stupid, naughty and rude cannot be determined by the arrangement of teeth and facial appearance, these features were used by adolescents to rate the personalities of other adolescents.

Mr Vice Chancellor Sir, the face, the teeth and quality of life are a threefold cord that is not quickly broken!

Orthodontic Treatment Need of Dental Students

Since the strong influence of the General Dental Practitioner in influencing patients and their parents' decision to undergo orthodontic treatment had been previously reported (Mavreas & Athanasiou 2009), we investigated the perceived orthodontic treatment need of final year dental students because of their level of understanding, having had about two years of exposure to orthodontics with the old Dentistry curriculum (Kolawole et., 2013).

Unlike in previous aesthetic and appearance related studies, most participants were males. Normative and perceived treatment need between the students and professional differed significantly, as only 8.1% indicated borderline and great need for treatment against 52.5% with the AC of IOTN, 61.6% with the DHC of IOTN and 54.5% with the DAI. This implied that self-perception of treatment need and treatment uptake do not depend solely on dental awareness and knowledge.

Orthodontic Treatment Need of Children with Special Health Care Needs

Malocclusion associated with aesthetic impairment may complicate the social problems that individuals with Special health care needs (SHCN) face such as discrimination (Muppa et al., 2013). Studies conducted in Nigeria among children and adolescents with SHCN have given conflicting results about malocclusion prevalence (Oredugba & Sote, 1999; Utomi & Onyeaso, 2009). We therefore determined the orthodontic treatment need of children and adolescents with and without SHCN resident in Ile-Ife (Akinwonmi et al., 2020). SHCN were categorised as hearing impairment (HI), visual impairment (VI), physical impairment (PI) or intellectual disability (ID).

It was observed that significantly more children and adolescents with SHCN than those without SHCN had great need for treatment based on the AC (15.2% vs. 4.3%) and DHC (28.0% vs. 18.3%) of IOTN and (28.0% vs. 12.0%) had mandatory need for treatment with the DAI. The orthodontic treatment need of participants with intellectual disability, visual impairments and multiple SHCN differed significantly from the control group, individuals with intellectual disability also had greater need for orthodontic treatment compared with those with physical and hearing impairments.

To the best of our knowledge, our study was the first to perform a comprehensive evaluation of the orthodontic treatment need of this population using a combination of the IOTN and DAI in our environment. This made it possible for us to once again highlight the differences that exist between the two indices. Similar to some of our previous studies, we identified a discrepancy with more participants having treatment need on dental health than aesthetic grounds. We also found a greater proportion of participants with malocclusions where treatment was considered highly desirable and mandatory based on the DAI compared with the IOTN. The evaluation of 10 different morphologic traits with the DAI may

reflect a more comprehensive evaluation of the occlusion. It is not surprising that the DAI comes recommended by the WHO.

Our finding which is of significantly greater need for orthodontic treatment in children and adolescents with SHCN, particularly those with Intellectual Disability (ID) and multiple SHCNs compared with their counterparts, justifies the need for prompt provision of interceptive and definitive orthodontic treatment to these individuals. Such treatment will improve their appearance and social acceptance.

Objective Evaluation of Facial Aesthetics with Anthropometry and Photometry

Human beauty and physical attractiveness have been preoccupations throughout history and often intersect with anthropometric standards. In our earlier studies we investigated extensively the subjective evaluation of facial aesthetics. Objective assessment of facial aesthetics can entail the use of anthropometry, photometry, cephalometry and three-dimensional imaging (Zwahlen et al., 2022).

Photometry involves making angular and linear measurements on standardized photographs, while anthropometry involves the measurement of soft tissue proportions in the human body. The proportional relationship of the height to the width of the face also determines the facial index which is the basis for overall facial type, which seems to have a relationship with ethnicity and body type (Proffit, 2018).

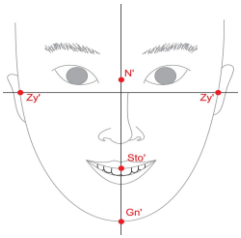


Figure 5: Facial Index determined by face height and face width (N-Gn/Zy-Zy)

In Nigeria, interpopulation variation in facial measurements have also been identified (Eliakim-Ikechukwu et al., 2013), however there had been no study evaluating anthropometric facial dimensions specific to the field of orthodontics in Nigeria. We therefore determined the facial anthropometric dimensions of a group of young adults, evaluated gender differences and determined the dominant facial type (Kolawole et al., 2018).

Facial anthropometric dimensions were significantly larger among males, for gonial width (go-go), inter-canthal distance, pupil-midfacial distance, nasal base width, mouth width, face height (n-gn) and lower face height (sn-gn). Although not significant, nasofrontal angle was the only dimension that was greater among females, while lip dimensions were similar between them. The dominant face type was mesoprosopic (round face) among females (40%) and hyperleptoprosopic (very long face) for males (32%). Facial type and BMI were not significantly correlated.

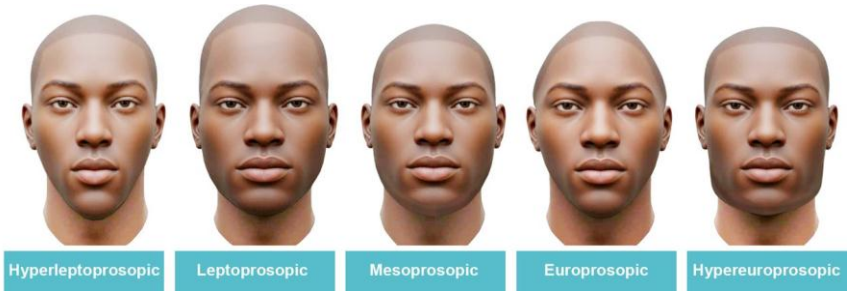


Figure 6: Facial Types determined with the Facial Index

The highlights of our study were the observations of thicker lip dimension, lower nasolabial angles and nasal base width dimensions which did not approximate inter-canthal distance as previously reported (Proffit et al., 2019). These observations make it imperative that orthodontic treatment is provided based on these standards without altering facial features and facial type negatively.

Table 2: Gender Distribution of Facial Types

Facial Type	Facial Index	Male No (%)	Female No (%)	Total No (%)
Hypereuroprosopic (Very broad face)	<80	1 (2%)	2 (4%)	3 (3%)
Europrosopic (Broad face)	80-84.9	10 (20%)	9 (18%)	19 (19%)
Mesoprosopic (Round face)	85- 89.9	11 (22%)	20 (40%)	31 (31%)
Leptoprosopic (Long face)	90- 94.9	12 (24%)	13 (26%)	25 (25%)
yperleptoprosopic (Very long face)	>95	16 (32%)	6 (12%)	22 (22%)
		50 (100%)	50 (100%)	100 (100%)

Likelihood Ratio = 7.80 df = 4 p = 0.099

Further attempts to objectively assess facial attractiveness led to the evaluation of facial proportions, and determination of golden ratio. The Golden ratio or Golden proportion is considered to be a perfect or ideal ratio for beauty. It has a numerical value of 1:1.618, with the facial length being 1.618 more than the facial width. Some studies have proven that harmonious faces of beautiful women follow the golden ratio (Wilson et al., 2023), on the contrary, others showed that many beautiful faces do not conform to the golden ratio rule. Pallett et al., (2010) suggested "new golden ratios" values of 0.46 and 0.36 for horizontal and vertical distances of the face respectively. They opined that attractiveness is optimized when the face's vertical distance between the eyes and the mouth is approximately 36% of its length and the horizontal distance between the eyes is approximately 46% of the face width.

Using standardised frontal facial photographs obtained from a sample of female Nigerian undergraduates, we investigated the relationship of derived proportions with ideal facial proportions, new golden ratio values and perceived facial aesthetics (Kumolu, Kolawole & Ajao, 2024). The horizontal third and vertical fifth

facial dimensions of studied Nigerians were observed to be unequal contrary to the opinion that they should be equal in well-proportioned faces. The horizontal middle third facial dimension was significantly lower than the upper and lower third dimensions. Postaurale- exocanthus (r) and Exocanthus – postaurale (l) were significantly lower than other vertical fifth dimensions. Our derived facial proportions did not conform with the ideal proportion of 1:1.618. The ratio of the dimensions of the width to height of the face (chk-chk : Tr me) was 1:1.38, mouth to chin – mouth to eyes dimensions (sto-me : sto-lc) was 1:1.48, nose to chin - nose to forehead dimensions (Me-ln: ln-tr) was 1:1.50, while the ratio of upper lip to total lip dimensions (subN- sto : subN-me) was 1:3.1.

Figure 7: Anthropometric measurements of horizontal thirds, vertical fifths and lengths of the face

We derived new golden ratios as 0.24 for horizontal and 0.35 for vertical face dimensions. The derived facial proportions (golden and new golden ratios) of photographs judged as aesthetic and unaesthetic by independent evaluators were similar except for the nose to chin and nose to forehead (Me-ln: ln-tr) dimensions, which were closer to the ideal values in the aesthetic group. Our observations corroborate the opinion that variation from average ratios can be compatible with pleasing facial aesthetics. Perhaps beauty really lies in the eyes of the beholder.

Table 3: Facial Proportions derived from Anthropometric Measurements

	Parameters	Range of values	Mean Derived Ratio	Ideal ratio
1	Chk-chk : Tr-me	1.29 -1.54	1:1.38	1:1.618
2	Sto-me: sto-lc	1.29 -1.77	1:1.48	1:1.618
3	Me-ln: ln-tr	1.34 -1.63	1:1.50	1:1.618
4	SubN-sto: subN –me	2.66 - 3.75	1:3.1	1:3

Table 4: New Golden Ratios derived from Anthropometric Measurements

Parameter	Range of values	Mean	Derived Ratio	Ideal New Golden Ratio
Vertical ratio (sto-lc/ Tr-me)	31.86 - 38.04	35.30	0.35	0.36
Horizontal ratio (enr-enl/ chk-chk)	20.31-27.25	24.11	0.24	0.46

Determinants of Perceived Physical Attractiveness

To fulfill my desire to understand further the psychological impact of malocclusion, I pursued a master's degree in psychology. I was fortunate to be taught and mentored by many erudite Psychologists and supervised by Prof. Funmi Togonu-Bickerstheh. I remember with much gratitude Prof. Sola Olowu of blessed memory.

As part of the requirements for the award of the degree, I investigated the determinants of perceived physical attractiveness among adolescents in Ile-Ife, Osun State (Kolawole, 2017), using three psychological scales; the Physical Attractiveness Rating Scale (PARS) developed by Lerner and Karabenick (1974), the Physical Attribute Questionnaire (PAQ) devised by Thornton and Moore (1993), and the State Self-Esteem Scale (SSES).

The face and ears were rated as the most attractive body parts. Females however perceived some specific body characteristics, namely mouth, teeth, nose, face, hair texture, hips, and thighs as

significantly more attractive than males. Evaluation of individual body characteristics predicted self-perception of physical attractiveness. (Kolawole & Togonu-Bickersteth, 2022). We were able to again demonstrate the aesthetic value of the face and corroborate previous reports that general physical attractiveness seems to be better predicted by ratings of facial attractiveness than other body part.

We also investigated the influence of socio-economic status, self-esteem and anthropometric body dimensions on self-perception of physical attractiveness among the adolescents. (Kolawole & Togonu-Bickersteth, In press). Self-perception of physical attractiveness did not differ based on socio-economic status, the adolescents' self-esteem however predicted their self-perception of physical attractiveness. Adolescents with lower Body Mass Index (BMI) also perceived themselves as more attractive than their counterparts. Our study findings upheld the assertions of Abraham Maslow (1943) that self-esteem is a basic human need.

Measuring Oral Health Related Quality of Life (OHRQoL) of Individuals with Malocclusion

Oral health-related quality of life (OHRQoL) is a multidimensional construct for assessing the self-perceived oral health of patients (Kunz et al., 2018). It includes a subjective evaluation of an individual's oral health, functional and emotional well-being, expectations and satisfaction with care and sense of self.

Multiple items questionnaires are the most widely used method of evaluating OHRQoL which include generic and condition-specific instruments. Generic instruments have the advantage of measuring side-effects or complications of treatment between different conditions, while condition-specific measures focus on problems relevant to a disorder, making them more sensitive, and acceptable to participants, with higher completion rates (Patel et al., 2016).

The connection between malocclusion and quality of life is complex and conflicting evidence exist. However, malocclusion

has been reported to negatively impact OHRQoL of both adolescents and adults (Guimarães et al., 2018; Sun et al., 2018).

Measuring Oral Health-Related Quality of Life (OHRQoL) in Children

In our earliest works on quality of life, we examined the impact of oral health and disease on the quality of life of a sample of children, using the Child Perceptions Questionnaire (CPQ_{11-14}) (Kolawole et al., 2011). CPQ_{11-14} is a 37-item measure encompassing four domains: oral symptoms, functional limitations, emotional and social well-being. It also contains two global questions on a child's oral health and the extent to which oral/oro-facial conditions affect his/her overall well-being (Jokovic et al., 2002). Our hypothesis was that children with more severe malocclusions (DAI) and greater caries experience [decayed, missing, and filled teeth (dmft/DMFT index)] would have higher CPQ scores indicating worse quality of life.

The CPQ_{11-14} was unable to discriminate between children in various categories, as children with more severe malocclusion and high caries experience did not report worse OHRQoL than their counterparts. Significant correlations were observed between OHRQoL and global ratings of oral health and overall well-being. The Impacts of oral conditions have also been found to depend on how adequately they perform in the domains of life that are important. Dental appearance did not appear to have been an important domain for these Nigerian children.

More recently we compared the performance of the original Child Perceptions Questionnaire (CPQ_{11-14}) and the short versions of the Child Perceptions Questionnaire (CPQ_{11-14}) at evaluating the Oral Health Related Quality of Life (Kolawole & Olowe, 2018). The CPQ_{11-14} was shortened to 16 and 8 items through the item impact and regression methods, to enhance its psychometric properties and facilitate its use in clinical settings and health surveys (Jokovic et al 2006). Two hundred secondary school children completed the original CPQ_{11-14}, the Impact Short Forms (CPQ_{11-14}-ISF:16 and

CPQ_{11-14}-ISF:8), and the Regression Short Forms (CPQ_{11-14}-RSF:16 and CPQ_{11-14} -RSF:8). Criterion validity, construct validity and internal consistency reliability were assessed.

All short-form versions revealed variability in the children's oral health-related quality of life (OHRQoL). They demonstrated excellent criterion validity and good internal consistency reliability. The short item questionnaires except for $CPQ_{11–14}$ -RSF: 8 detected greater impacts in OHRQoL than the original CPQ_{11-14}, with significant differences identified with CPQ_{11-14} -ISF:16 and CPQ_{11-14}-RSF:16. All short forms had better correlation with the global ratings of oral health and overall well-being than the original CPQ_{11-14}. Differences in content had little effect on the performance of the item-impact and regression versions, but with regards to length the 16 item versions performed better and may be the preference for clinical use and epidemiological surveys.

Limitations of generic measures had necessitated a child-centered malocclusion-specific OHRQoL measure. The Malocclusion Impact Questionnaire (MIQ) is a condition-specific tool developed by Patel et al. (2016). Excited about the development of a condition-specific tool for use among adolescents, we evaluated the impact of malocclusion on OHRQoL of adolescents aged 11-14 years in Ile-Ife and determined the effect of gender, age and socio-economic class on OHRQoL. We hypothesised in our study that malocclusion, gender, age and socio-economic class would not significantly impact oral health related quality of life in adolescents. (Kolawole & Ayodele-Oja, 2021). We got our manuscript published in the Apex Journal of Orthodontics, the American Journal of Orthodontics and Dentofacial Orthopaedics.

We used the MIQ against the CPQ_{11-14} which served as the gold standard. Both the CPQ_{11-14}-ISF:16 and MIQ identified the impact of malocclusion on OHRQoL, although a gradient based on malocclusion severity was not observed. Sex, socioeconomic class, and malocclusion severity had no significant effect on OHRQoL, however, OHRQoL differed significantly between the age groups.

Age was a significant predictor of OHRQoL with increasing age accounting for improvement in OHRQoL. MIQ demonstrated good criterion validity with CPQ_{11-14}-ISF:16 (r = 0.59), our scores standardized to 100% gave higher scores with the MIQ indicating greater sensitivity of this condition specific measure.

In a more recent study, under my supervision, the possible relationship between OHRQoL determined with the MIQ and nickname and bullying experience was examined (Awosoji, 2023). OHRQoL did not differ between participants with and without nicknames and bullied and non-bullied participants. No difference in OHRQoL was also identified based on malocclusion severity determined with the DAI, AC of IOTN and DHC of IOTN. The MIQ was however still able to identify the impacts of malocclusion on OHRQoL. We recommend its routine use along with occlusal indices in orthodontic patients.

Measuring Oral Health-Related Quality of Life (OHRQoL) of Adults

The focus of our initial studies on OHRQoL was on children, but with the increasing acceptance of braces, a sizeable number of our orthodontic patients are now adults. The Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ), a condition specific OHRQoL measure was developed by Klages et al. (2006) to produce a measure which is selective and specific to orthodontic aspects of OHRQoL in young adults. It is a 23-item condition-specific OHRQoL measure encompassing four subscales: Dental Self-Confidence, Social Impact Psychological Impact and Aesthetic Concern.

We investigated a sample of 165 first-year university undergraduates using the Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ) and the Perception of Occlusion Scale (POS) [Espeland & Stenvik, 1991], a self-rating instrument, which assesses the arrangement of teeth. Additionally, we evaluated self- and examiner-perceived dental aesthetics with the Aesthetic Component (AC) scale of the Index of Orthodontic Treatment

Need (IOTN) and a modification of the Dental Aesthetic Index (DAI) (Kolawole et al., 2012).

Our study revealed that participants with varying degrees of self- and examiner-perceived dental aesthetics and treatment need demonstrated significant differences in well-being with the dental self-confidence subscale demonstrating the strongest difference. Identification of dental self-confidence as the most affected domain corroborates previous reports that unacceptable occlusal traits operate against the psychological well-being of individuals by eliciting an unfavourable social response and poor self-esteem (Sehrawat et al., 2022).

In another study, we also evaluated the relationship between severity of malocclusion, orthodontic treatment need and oral health related quality of life (OHRQoL) among dental students using the PIDAQ (Kolawole et al., 2014). The study demonstrated that OHRQoL differed significantly according to malocclusion severity. There was a decrease in self-confidence, the psychological and social impact were worse and aesthetic concern worse as the severity of malocclusion increased. Multiple linear regression analysis showed that the POS had a significant effect on all the domains, while normative treatment need had a significant effect only on the dental self-confidence. Our results once again confirmed the assertion that individuals with unacceptable dental appearance may experience social or psychological handicap. Aesthetic Concern domain demonstrated the greatest impacts, also upholding the opinion that visible irregularities elicit the greatest dissatisfaction with personal dental appearance (Foster Page et al., 2013).

Measuring Oral Health-Related Quality of Life (OHRQoL) of Orthodontic Patients

Orthodontic treatment is frequently sought to effectuate an improvement in aesthetics and a subsequent enhancement of psychosocial well-being, which contributes to Quality of Life (QoL) (Chen, 2010). The impact of malocclusion on oral health-

related quality of life among patients seeking orthodontic treatment was evaluated (Agbaje et al., 2018a). Sixty-one patients requiring fixed orthodontic appliance therapy completed a generic measure, the United Kingdom Oral Health-Related Quality of Life (OHRQoL-UK) questionnaire (McGrath & Bedi, 2001) and the condition-specific PIDAQ. Orthodontic treatment need was determined with the DAI. A higher OHRQoL-UK score indicated better OHRQoL, while for the PIDAQ, higher scores indicated worse OHRQoL.

With the PIDAQ, we were able to demonstrate significant and progressive worsening of quality of life with increasing malocclusion severity. The Social Impact and Aesthetic Concern domains were most affected. We observed a weak negative correlation between overall OHRQoL-UK and the overall PIDAQ. The inverse correlation though significant was not strong showing that the instruments may not necessarily infer the same meaning. Our findings corroborate a previous report (Lee et al., 2007) that generic and condition specific OHRQoL measures are complementary, rather than alternative sources of information.

Changes in OHRQoL during Fixed Appliance Treatment

The treatment of malocclusion places a considerable burden on health care resources globally, and particularly in Nigeria, where treatment is based on fee-for-service rendered (Otuyemi, 2001). Demonstrating substantial improvement in OHRQoL, is therefore crucial to justify payment for orthodontic treatment. We investigated early changes in the OHRQoL during fixed appliance treatment (Agbaje et al., 2018b). Patients were investigated longitudinally and OHRQoL was assessed with OHRQoL-UK and the PIDAQ, at baseline (T^0), 1 week (T^1), 1 month (T^2), 3 months (T^3), and 6 months (T^4), after commencement of appliance therapy.

We were able to demonstrate that wearing of fixed orthodontic appliances caused significant deteriorations in OHRQoL during the first week to a month of commencement of fixed orthodontic appliance therapy [T^0 (55.69) to T^1 (51.45)], based on the

OHRQoL-UK overall and subscale scores. This was attributed to the initial pain, discomfort and limitations associated with appliance use. This deterioration was followed by a progressive improvement from one month to six months of treatment [T^2 (54.60) to T^4 (57.86)]. Progressive and significant improvements in OHRQoL were also evident with the PIDAQ throughout the study duration.

The significant improvement in dental self-confidence, social interactions and psychological well-being showed tangible evidence that malocclusion does impact quality of life and treatment with fixed orthodontic appliances gives remarkable improvement in quality of life. Mr Vice Chancellor Sir, a threefold cord that is not quickly broken and neither is the bond between the face, the teeth and quality of life.

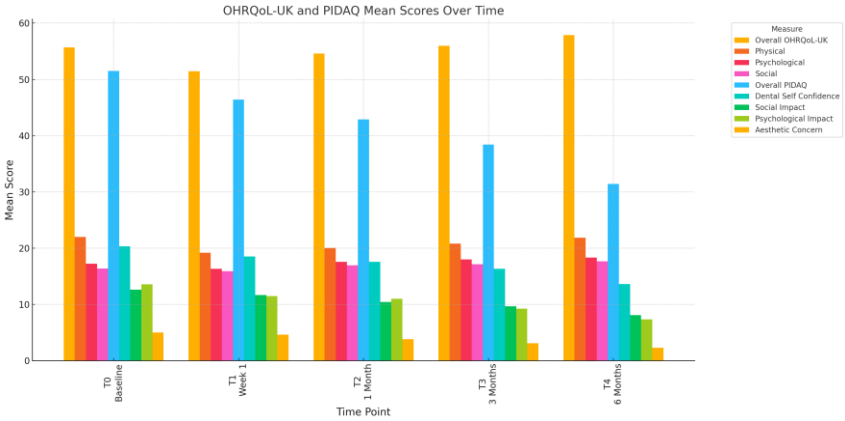


Figure 8: Distribution of mean OHRQoL-UK and PIDAQ scores at time intervals

The Relationship between Self-esteem and OHRQoL

Based on the background that unacceptable dental appearance may lead to poor self-esteem and evoke unfavourable social responses, we directly examined the relationship between self-esteem, orthodontic treatment need and oral health related quality of life (OHRQoL) among young adults. We employed the Rosenberg

Self-Esteem Scale (RSES), State Self-Esteem Scale (SSES) and PIDAQ (Oyekunle & Kolawole, 2021). While self-esteem did not differ, OHRQoL of participants differed significantly according to orthodontic treatment need. Significant relationships were observed between self-esteem and OHRQoL, and also between orthodontic treatment need and OHRQoL. Self-esteem and orthodontic treatment need were significant predictors of OHRQoL. Increase in self-esteem accounted for improvement in OHRQoL, while worse grade of subjective orthodontic treatment need accounted for worsening OHRQoL. We are able to add to the body of evidence that self-esteem and malocclusion severity are salient predictors of OHRQoL. Our results also indicated that the self-reports of the participants were more relevant at predicting OHRQoL than professional evaluations of orthodontic treatment need.

Table 5: Multiple Regression Analysis of Predictors of Oral Health Related Quality of Life assessed with PIDAQ.

Variables	Standardized Coefficients B	T	Sig	F	p	95% confidence Interval for B	
						Lower bound	Upper bound
Constant		2.599	.010	6.249	0.000	8.478	61.825
Gender	.096	1.467	.144			-.987	6.714
Age	-.028	-.421	.674			-1.014	.658
RSES	.042	.512	.609			-.412	.700
SSES	-.263	-3.217	.002			-.591	-.142
Subjective treatment need	.162	2.350	.020			.298	3.416
Objective treatment need	.088	.882	.379			-1.000	2.618
DHC of IOTN	.115	1.462	.145			-.816	5.490
DAI	.031	.312	.756			-.287	.395

$F = 6.249$ $p = 0.000$ $R^2 = 0.207$ and Adjusted $R^2 = 0.174$

The Relationship between Personality Disorders, Orthodontic Treatment Need and Oral Health Related Quality of Life (OHRQoL)

An individual's experience of social and emotional impacts of malocclusion OHRQoL can also be influenced by the psychological profile including personality disorders (Agou et al., 2008). Personality disorders are a rigid and unhealthy pattern of thinking, feeling, and behaving that significantly impairs relationships and daily life (DSM-5-TR; American Psychiatric Association, 2022).

Personality disorders have been found to significantly impact an individuals' display of low self-esteem, poor self-image, the need for social acceptance and validation (Weme et al., 2023). It seemed reasonable to postulate that personality disorders may influence perception of dental aesthetics and the impact of malocclusion on wellbeing which may form the basis for subjective need for orthodontic treatment. Under my supervision, the interrelationship between personality disorders, orthodontic treatment need, and OHRQOL was therefore evaluated among university undergraduates (Adewumi, 2024). Participants completed the Personality Disorder Questionnaire- IV (PDQ-4), a 99-item scale, and the PIDAQ, while orthodontic treatment need was determined with the IOTN.

The Dependent personality disorder was the most prevalent (48%), while the least prevalent was Antisocial personality disorder (29.6%). Orthodontic treatment need did not differ between those affected and unaffected by the various personality disorders, however, individuals with Avoidant, obsessive-compulsive (OCD), Schizoid and Narcissistic personality disorders exhibited significantly worse OHRQoL, with social interactions most severely affected. Self-esteem was significantly lower in individuals with Paranoid, Avoidant, Schizoid, and Antisocial personality disorders. Significant relationships were observed between Avoidant and Schizoid personality disorders and

OHRQoL and Histrionic personality type disorder and orthodontic treatment need.

Our study was able to demonstrate that personality disorders have significant and varying effects on OHRQOL, self-esteem and orthodontic treatment need. The high prevalence of personality disorders observed in this study was an eye-opener to the possibility of its occurrence in prospective orthodontic patients. We recommend collaborations between orthodontics, psychologists, and psychiatrists to advance the understanding of the complex relationship between personality disorders, OTN and OHRQOL.

THE ORAL HEALTH CONSEQUENCES OF MALOCCLUSION

Malocclusion, Dental Caries and Periodontal Health

Another health risk associated with malocclusion is greater susceptibility to injury and dental diseases. It appears to be a situation of *"If the foundations be destroyed, what can the righteous do?" (Psalm 11:3).* When alignment (the foundation) is defective, other structures (oral health) begin to fail. Protruding maxillary incisors increase the likelihood of traumatic dental injuries, abnormal occlusal forces can lead to periodontal compromise. Extreme overbite can cause gingival damage while an incisor in crossbite may suffer abrasion from its opposing tooth.

Fractured proclined maxillary incisor

Crossbite with possibility of abrasion

Traumatic deep overbite

Gingival inflammation due to crowding

Figure 9: Some health risks associated with malocclusion

Opinions about the contribution of malocclusions to the etiology of dental caries and periodontal health are conflicting. (Leck et al., 2022). This led us to investigate the relationship between irregularity of teeth, lip competence and periodontal health among a sample of secondary school children (Kolawole et al., 2010). Plaque accumulation and gingivitis severity were significantly different across the malocclusion groups categorised with the Little's Irregularity Index (LII) scores. The level of plaque accumulation also differed between individuals with competent and incompetent lips. Significant relationships were identified between the LII and Plaque Index and lip competence and the Plaque Index. It was interesting to observe that the LII was more sensitive than the DAI at detecting the effect of crowding on periodontal health. As previously reported (Leck et al., 2022), our findings demonstrated that crowding and lip incompetence were risk factors for poor periodontal health.

More recently we investigated the association between specific malocclusion traits, caries, oral hygiene, and gingival health of 495 children, with mixed dentition (Kolawole & Folayan, 2019). Significantly greater proportions of participants with crowding and buccal crossbite had caries, while significantly more children with increased overjet and anterior open bite had moderate to severe gingivitis. Malocclusion severity of participants with no/mild gingivitis compared with moderate/severe gingivitis differed significantly. Crowding, buccal crossbite and poor oral hygiene also significantly increased the odds of having caries. Increased overjet, anterior open bite and poor oral hygiene were the significant traits associated with gingivitis.

We were able to demonstrate that children with buccal crossbite, a situation in which the buccal cusps of some posterior upper teeth are positioned buccal to the lower teeth in centric occlusion, had more than six times increased risk of having caries. This association between buccal crossbite and caries had not been highlighted in any other study prior to ours to the best of our knowledge. The results of our study once again highlights that

there are direct oral health risks associated with malocclusion thereby justifying orthodontic treatment. Caries and gingivitis resulting from untreated malocclusion traits can set up further oral health and systemic health problems for children and adolescents. Gingivitis is associated with increased risk of cardiovascular disease, type 2 diabetes mellitus, adverse pregnancy outcomes, and osteoporosis (Umeizudike et al., 2022).

Oral Hygiene Measures and Periodontal Health

The relationship between oral hygiene practices, socioeconomic status and periodontal health was examined in a group of children (Kolawole et al., 2011). It was observed that the accuracy of self-reported toothbrushing frequency is questionable. Gingival health was influenced by gender, socioeconomic status, and oral hygiene frequency. Male gender and use of medium textured toothbrush were the predictors on gingivitis. We identified a need for regular oral health education and motivation to apply advice given among school children.

Caries Prevention Tools, Practices and Caries Risk Indicators

Children's health-related attitude and behaviours are taught and adopted at home through a process called primary socialization. We determined the proportion of children who use a combination of caries prevention approaches and factors associated with preventive oral health care practices of children in Ile-Ife. (Folayan et al., 2014). The results showed that mothers' oral health behaviours were significant predictors of children's oral health behaviours. The child's knowledge of caries preventive measures significantly increased the odds of brushing twice daily or more. This study highlights the important role of mothers in helping children develop good oral health practices.

The association between use of recommended oral self-care (ROSC), caries prevention tools and presence of dental caries was also investigated (Folayan et al., 2016). The use of single or combined use of ROSC caries prevention tools had no association with presence of caries. Brushing more than once a day reduced

the odds of having caries while consumption of sugar between meals once a day or more increased the odds of having caries after adjusting for age and gender. Our findings suggest that promoting twice daily tooth brushing as well as instituting measures to reduce frequency of consumption of sugar snacks in between meals in the study population as a public oral health effort may be beneficial.

The association between the family structure (parental structure, number of siblings, and birth rank), caries presence of caries, and oral hygiene practices, of 5-12-year-old children was examined. (Folayan et al., 2017). We found that the birth rank and number of siblings increased the chances of use of fluoridated toothpaste and dental caries respectively. Children who were not primogenitor had significantly reduced odds of using fluoridated toothpaste when compared with children who were primogenitors or only children. Furthermore, having 0-2 siblings significantly reduced the odds of having caries when compared with children who had three or more siblings. Children who used fluoridated toothpaste had significantly increased odds of having good oral hygiene.

Early Childhood Caries Risk Indicators

Early Childhood Caries (ECC) is defined as the presence of caries lesion in a primary tooth in children below the age of 71 months. Our previous studies had established that malocclusion features like crowding and buccal crossbite significantly increased the odds of having caries (Kolawole & Folayan, 2019). Among 497 children, we determined the prevalence of ECC, and the biological and non-biological factors that are ECC risk indicators for the study population. (Folayan et al., 2015).

The prevalence of ECC was low as only 6.6% had ECC. The four risk indicators identified were the child's gender, mothers' knowledge of oral health, consumption of sugary snacks in between meals more than three times a day, and the child's oral hygiene status. Females and children with mothers who had good knowledge of oral health were less likely to have ECC. Also, children who consumed sugary snacks in between meals three

times a day or more and children with fair oral hygiene were more likely to have ECC.

We again added to the body of evidence that promoting good oral hygiene practices and enhancing mothers' knowledge of oral health may help reduce further, the risk for ECC in the study population.

Association between Early Childhood Caries and Malnutrition
The association between early childhood caries (ECC) and malnutrition is not clear. This led us to investigate this in children under 6 years (Folayan et al., 2019). The prevalence of ECC was significantly lower in children who were stunted, almost seven times higher in children who were overweight, and predictively absent in children who were underweight when compared with children who had normal weight. Our observation that being overweight was significantly associated with increased occurrence of ECC, calls for vigilance among overweight children.

Oral Habits and Oral health
I co-pioneered the establishment of an Oral habits Study Group in the Department of Child Dental Health in 2013. Our objective was to identify the various factors that influence oral health, oral habits and its expressions in our environment.

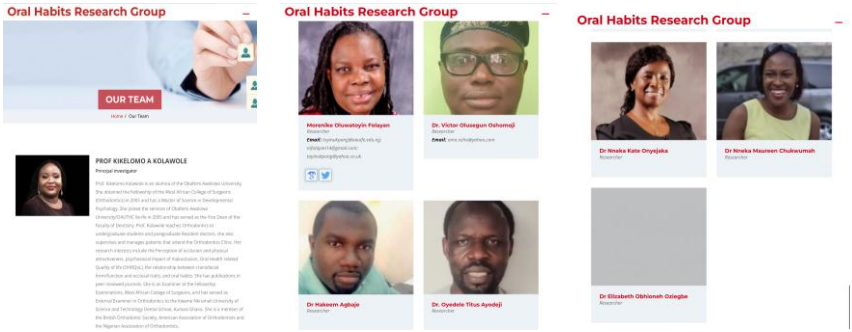


Figure 10: Oral Habits Research Group

Oral habits are body-focused repetitive behaviours in which there is an irresistible urge or impulse to perform (Du et al., 2022). They include digit, lip or pacifier sucking, lip biting, nail biting (onychophagia), object biting, tongue thrusting and bruxism.

The commonest oral habit is digit sucking. A term neonate is born with the ability to suck, a skill that is functional by 28 weeks gestational age and evidence show that some fetuses suck their digits in utero (Shandley et al., 2021). Infants grasp and put objects in their mouth during the first year of life to gain a sense of its size and shape.

Figure 11a: A 2-year-old sucking her digits

Figure 11b: Image of a fetus sucking in utero

Oral habits in childhood are often considered normal and may be overlooked. Research suggests that factors like fatigue, boredom, excitement can trigger these habits. Oral habits may also serve emotional functions such as providing a feeling of warmth, contentment, comfort, and a sense of security. When oral habits persist beyond five years of age, they may reflect anxiety or other emotional problems (Dhote et al., 2021). Persisting in this behaviour may also lead to additional issues, including problems with the digits, infections and dental complications further exacerbating existing psychological distress (Sani et al., 2019).

Oral habits have been the subject of intense international research, our search through the literature however identified several gaps. The wide variation in the prevalence of oral habits reported within and outside Nigeria, we also found that a poorly evaluated

aetiological factor responsible in the initiation of oral habits was infant feeding profile. Information was also lacking on the family structure of children that engaged in oral habits and the reasons for persistence of oral habits in some children. Very little was also known about the link with dental anxiety. No study had identified the impact of the severity of digit sucking on occlusal profile and the differences in the treatment need of those with and without oral habits.

We also found inconclusive results on the relationship between oral habits and dental caries and gingivitis. A variety of techniques have been tried to break oral habits because of the detrimental effects but very few were based on professional advice. A Nigerian study had reported that some mothers employed restraints and topical application of bitter substances and pepper to the digits (Ibekwe et al., 2011). To address the existing knowledge gap, we conducted a household survey among children aged 12 years and below in Ife Central Local Government Area of Osun State, the results are here presented.

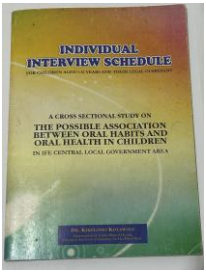


Figure 12: Oral Habits Household Survey Interview Schedule

Oral Habits Prevalence and Oral Health

We determined the prevalence of oral habits among the 992 study participants as 13.0%, with digit sucking observed as the most common habit (7.2%). Digit sucking was not a significant predictor of caries and oral hygiene status, it increased the odds of having caries but decreased the odds of having poor oral hygiene insignificantly. (Kolawole et al., 2016). No significant relationship was also identified among sex, digit sucking, OHS, and presence

of gingivitis. We were able to conclude that increasing age and low socioeconomic status were factors that significantly increased the chances of having poor oral hygiene and gingivitis (Agbaje et al., 2016).

Aetiological Factors Responsible in the Initiation of Oral Habits

The role of age, sex, socioeconomic status, infant feeding practices and duration of breast and bottle-feeding as predictors of oral habits was investigated (Chukwumah et al., 2018). A significantly higher proportion of children who were not exclusively breastfed had digit sucking and object biting habits when compared with children who were exclusively breastfed. The form of breastfeeding was a significant predictor of oral habits, while age, sex, socio-economic status and breastfeeding duration were not significant predictors. The odds of having oral habits were significantly reduced for children who were exclusively breastfed when compared with children who were not exclusively breastfed. Our findings corroborated the report of prior studies (Onyeaso, 2004; Uwaezuoke et al., 2003) and justify supporting and promoting exclusive breastfeeding.

Digit Sucking, General Anxiety and Dental Anxiety

Digit sucking can represent untreated anxiety or other emotional problems, but very little is known about the link between oral habits and dental anxiety. The level of general and dental anxiety of four hundred and fifty 6 to 12 year old children was measured using the Revised Child Manifest Anxiety Scale (RCMAS) and Dental Subscale of the Child Fear Survey Schedule (CFSS-DS) respectively. (Folayan et al., 2018). It was observed that only 12.9% of respondents had high clinically significant trait anxiety, while most respondents had high dental anxiety (52.7%). Digit sucking was not a significant predictor of dental anxiety and general anxiety. However, children with high general anxiety had significantly higher odds of having caries and those with high dental anxiety significantly higher odds of having good oral hygiene.

Perhaps if more culturally sensitive instruments were available for measurement of anxiety our results may have been different. After a critical appraisal of the tools for assessing dental fear in children, we identified the need for development of appropriate culturally sensitive instruments (Folayan & Kolawole, 2004). Many years later, this challenge, has not been taken and our study still employed the Dental Subscale of the Child Fear Survey Schedule developed in Philadelphia USA. This calls for a collaboration between colleagues in Child Dental Health, Psychiatry and Psychology.

Oral Habits and Family Structure

We explored the association between the child's family socio-economic status, number of siblings, birth rank, the parental status (living with single parent, stepparents, guardian or both parents) and the presence of oral habits (Oyedele et al., 2016). No relationship was observed between the presence of oral habits and parenting structure, birth rank and socioeconomic status. However, the number of siblings a child had was significantly associated with the presence of oral habits as children with 2-4 sibling had a higher probability of engaging in oral habits. This is probably because such children must compete with other siblings for the mother's limited time and attention.

Oral Habit Breaking Methods.

A lot of efforts at breaking oral habits are informed by knowledge and attitude, with professional advice rarely sought (Ibekwe et al., 2011). There is an anecdotal report of a gangrenous finger in a child that required amputation due to overzealous attempts of parents to break a digit sucking habit here in Ile-Ife. This underscores the importance of the application of appropriate habit breaking methods. We therefore tried to identify methods instituted by mothers resident in our suburban environment to break oral habits in their children, reasons for wanting to break the habit, and the association between instituted methods and the sociodemographic profile of the mothers (Onyejaka et al., 2018).

We found that about 65.1% of mothers made efforts to break oral habits, the most common methods employed for breaking habits were punishment (50%) and application of unpleasant flavored substances (16.7%) while the combination of wrapping the hand and rewarding the child was the least employed (1.2%). Only 20% of concerned mothers sought professional advice. There was no significant association between age, mother's educational level and the use of professional or nonprofessional methods to break oral habits. Efforts need to be made to improve the public awareness about the availability of professional services for managing oral habits and the potential consequence of employing unprofessional methods.

Oral Habits and Malocclusion

Information on the commulative effect of the frequency, intensity and duration of practice of oral habits on occlusion was lacking in our environment. We therefore developed a Digit Sucking Severity Index [(DSSI) Kolawole et al., 2018] as highlighted in Table 6. The presence or absence of digit sucking habit, frequency of engaging in habit, duration, intensity and presence or absence of clinical features of digit sucking on the upper extremities were combined to arrive at a composite score. The association between oral habits and malocclusion, orthodontic treatment need, and the impact of the severity of digit sucking on occlusal profile were determined (Kolawole et al., 2018).

Digit sucking severity was determined as 21.1% mild, 62.0% moderate while only 16.9% of participants were severe digit suckers. The most common malocclusion traits among participants who engaged in oral habits were spacing (29.9%), crowding (21.7%) and increased overjet (16.4%). Tongue thrusting and bruxism habits were significantly associated with greater severity of malocclusion, probably because of the possibility of indulging in these habits for long uninterrupted hours. Among participants with oral habits, 80.6% had no need for treatment, 13.4% needed elective treatment and treatment was mandatory for 6%. No

difference was observed in malocclusion severity between digit and non-digit suckers.

Table 6: Digit Sucking Severity Index (DSSI) (Kolawole, et al., 2018)

Classification of severity of digit sucking	Positive history of sucking	Frequency of digit sucking	Duration of digit sucking	Intensity of digit sucking	Presence of clinical features of digit sucking
No digit sucking Score: 0	No (score-0)	No history (score-0)	No history (score-0)	No history (score-0)	No abnormality on digits (score-0)
Mild Score: 1-4	Yes (score-1)	Less than once a day (score-1)	Less than 10 minutes per day (score-1)	No popping or sucking sound heard (score-0)	Clean digits due to sucking habit (score-1)
Moderate Score: 5-8	Yes (score-1)	Once a day (score-2)	10-30 minutes per day (score-2)	popping or sucking sound heard (score-1)	Redness, wrinkled chapped or blistered finger (score-2)
Severe Score: 9 - 11	Yes (score-1)	Several times a day (score-3)	Almost continually (score-3)	popping or sucking sound heard (score-1)	Digit deformity Dishpan to nailbed damage (score-3)

To the best of our knowledge this was the first most representative community-based survey conducted to determine the prevalence of oral habits, and associated malocclusion traits in Nigeria. This household survey permitted the inclusion of pre-school children; an age category that is highly important for oral habits. It therefore likely to have provided a true representation of the prevalence of oral habits and malocclusion in children in Ile-Ife.

Developmental Dental Hard-Tissue Anomalies in Children

Disturbances of dental development have been implicated in the aetiology of malocclusion. The prevalence, pattern, and clinical presentation of developmental anomalies in hard dental tissues in

the primary dentition and mix dentition of children was therefore investigated (Temilola et al., 2014). Dental hard-tissue anomalies were noted in 26.6% of the 1036 studied children, with the most prevalent anomalies being hypoplastic enamel (16.1%) and dens evaginatus (6.4%). A Significantly more cases of dental hard-tissue anomalies were identified in the permanent than primary dentition, and in the maxilla compared with the mandible ($p < 0.05$). This large survey of dental hard-tissue anomalies in Nigerian children provides anthropological and clinical data that will aid in the detection and management of dental problems in Nigerian children and perhaps elsewhere in the world.

THE BIOLOGICAL AND FUNCTIONAL ASPECTS OF MALOCCLUSION

Relationship between Craniofacial Form, Function and Occlusal Traits

The anatomical architecture of the craniofacial complex is both a determinant and consequence of the functions it supports. Pressures generated by masticatory function could potentially affect dentofacial development. Conversely, aberrations in form whether congenital, developmental, or acquired can significantly compromise function, with far-reaching consequences for oral health, general well-being.

Anterior Open Bite

Anterior open bite is a vertical occlusal discrepancy with varied characterisations and significant functional and aesthetic challenges. Our review of existing literature on anterior open bite (AOB) highlighted significant racial/ethnic differences in prevalence and characteristics (Agbaje et al., 2012). Notably, AOB is five times more prevalent in blacks than in whites or Hispanics, while severe deep bite is twice as prevalent in whites. Causes of AOB vary, including oral habits, allergies, neurological issues, genetic factors and iatrogenic factors during orthodontic treatment. We emphasized the importance of distinguishing between dental and skeletal AOB for effective treatment. Treatment options range from observation and habit control to complex surgical procedures,

underscoring the need for personalised approaches.

Figure 13: Frontal and lateral views of Anterior Open Bite

Bimaxillary Proclination, Tongue Dimensions and Oropharyngeal Airway

Bimaxillary proclination or full mouth appearance is a dentoalveolar condition associated with proclination of upper and lower incisors with resultant aesthetic challenges. A previous study in Nigeria established that 20% of Nigerians have this condition (Isiekwe, 1990). Research has suggested that tongue size and posture of oropharyngeal organs may have great influence on the positioning of dentoalveolar structures and vice versa. We evaluated the relationship between tongue dimensions and bimaxillary proclination by comparative analysis of the cephalometric tracings of patients with and without bimaxillary proclination (Adesina et al., 2013a). Significantly higher dental measurements were observed in the bimaxillary group except interincisal angle. Tongue thickness, tongue length and intermaxillary space length were also significantly greater in the bimaxillary proclination. Overjet and interincisal angle were the only predictors of bimaxillary proclination, however the higher tongue dimensions observed in individuals with bimaxillary proclination confirmed the assertion that tongue dimension can influence dental arch form.

Figure 14: Frontal and lateral views of Bimaxillary Proclination

We investigated the relationship between oropharyngeal space and incisor position in patients with bimaxillary proclination versus normal incisal relationship (Adesina et al., 2013b). Although soft palate measurements were generally higher in the bimaxillary proclination group, oropharyngeal dimensions (soft palate area, oropharyngeal area, lingual and palatal airways) were unexpectedly larger in the normal proclination group. However, these differences were not statistically significant ($p > 0.05$). Furthermore, none of the oropharyngeal variables predicted interincisal relationship. Our findings suggest that oropharyngeal airway dimensions do not significantly differ between individuals with bimaxillary proclination and those with normal incisal relationship.

Occlusion and Dental Arch Dimensions of Children with Adenoid Hypertrophy

Nasal obstruction can lead to alteration in mode of breathing influencing craniofacial development. Enlarged nasopharyngeal adenoids have been reported as one of the most frequent causes of nasal obstruction (Michael et al., 2006). The effect of adenoid hypertrophy and sociodemographic variables on the occlusion and dental arch dimensions of children in Ile- Ife were evaluated (Osiatuma et al., 2015).

Ninety children aged 3-12 years attending the Otorhinolaryngology Clinic at Obafemi Awolowo University Teaching Hospital Ile-Ife diagnosed as having hypertrophied adenoids were compared with 90 children recruited from the Child Dental Health Clinic who served as control. We were able to demonstrate that the presence of

hypertrophied adenoids affects the occlusal characteristics in the three planes of space. The occurrence of Class II division 1 was significantly higher in the adenoid group, particularly in the 3-5years age group while posterior crossbites occurred significantly more in 9-12years age group of the adenoid patients. Class II division 1 and deep bite occurred more in the male than female adenoid subjects. Age was a predictor of anterior open bite while BMI was a predictor of class II occlusion in adenoid subjects.

The arch and palatal vault dimensions of the children with hypertrophied adenoids were also determined (Osiatuma et al., 2017). The Maxillary arch dimensions were generally shorter in the adenoid group, although only the difference in total maxillary arch length was significant. Mandibular arch dimensions were also significantly shorter in the adenoid group except the inter-molar width. Adenoid subjects had significantly increased palatal heights at canine, premolar, and molar levels and reduced palatal volume compared to the control subjects. In addition, female adenoid subjects showed significantly shorter maxillary and mandibular inter premolar widths and maxillary inter molar width compared with their male counterparts.

The shorter arch dimensions which were more evident in the mandible may represent somatic growth impairment due to decrease in nocturnal growth hormone (GH) secretion because of interferences with slow wave sleep (SWS) due to frequent arousals (Timo, 2007). Our study findings have implications for orthodontic patient care. Class II division 1 malocclusion significantly affects quality of life because of its visibility, early interventions with normalization of nasal airflow will be beneficial. Reduced palatal volume connotes a corresponding reduction in tongue space, caution should therefore be exercised with prescription of extraction for patients with enlarged adenoids during comprehensive orthodontic therapy. The option of maxillary expansion which increases palatal volume may be more appropriate.

This study once again demonstrated that the relationship between the face, the teeth and quality of life is like a threefold cord that is not quickly broken. When teeth are habitually kept apart due to mouth breathing, the postural alterations lead to further disruption in teeth arrangement, jaw dimensions and development of long face appearance which worsens quality of life.

The Effect of Digit Sucking on Craniofacial Form and Function

Building on our previous research on oral habits and oral health, we investigated the impact of digit sucking on masseter muscle thickness (MMT) and upper airway (UA) dimensions. Using ultrasound, we compared 30 children who engaged in digit sucking habit with 30 children without the habit, investigating differences in MMT and UA (Njokanma et al., 2023).

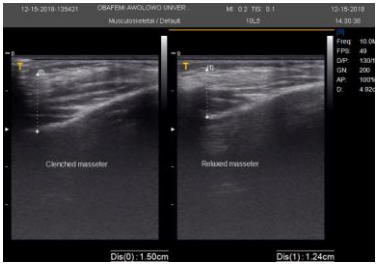
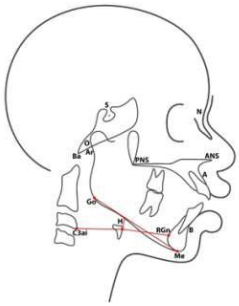


Figure 15: Ultrasound image of the masseter muscle in the clenched and relaxed states

It was noted that masseter muscle was generally thicker among the digit sucking group, both in the contracted and relaxed states when compared with the control, but with insignificant differences. The width of the nasopharynx (P1) was significantly decreased among the digit suckers. The dimensions of the oropharynx (P2) and hypopharynx (P3) were wider, while the soft palate length (PNS-U1) and thickness (MPT) and the posterior bony boundary of the nasopharynx (PNS-Ba) were insignificantly reduced in the digit sucking group compared with the control group.

We also determined the effect of the digit-sucking habit on the vertical and horizontal position of the hyoid bone in Nigerian children. (Njokanma et al., 2019). The human hyoid bone is a horseshoe-shaped bone located in the neck opposite the lower portion of the third cervical vertebrae, which plays important role in mastication, deglutition, respiration, and speech The altered tongue position adopted during digit sucking may influence the position of the hyoid bone (Bordoni et al., 2018).



Measurement	Description
Vertical position of the hyoid bone	H-Ml
Horizontal position of the hyoid bone	H-C3ai
Horizontal position of the hyoid bone	H-Rgn

Figure 16: Diagram showing the measured cephalometric hyoid bone parameters

We found that digit sucking habit influenced both the vertical and horizontal position of the hyoid bone. The mean vertical linear distance between the hyoid and mandibular plane (H-ML) and the horizontal position (HC3ai) were significantly increased in the digit sucking group when compared with the non-digit suckers. However, the mean horizontal linear distance between the hyoid and the retrognathion (HRgn) was insignificantly reduced in the digit sucking group.

Our study findings provide valuable insights into the potential influence of digit sucking on craniofacial and airway development. Digit sucking habit caused a statistically significant narrowing of the width of the nasopharynx and a more inferiorly and anteriorly

positioned hyoid bone in relation to the mandible and the third cervical vertebrae respectively. Narrowing of the nasopharynx has implications for upper airway patency, breathing and obstructive sleep apnea OSA). A more inferiorly positioned hyoid bone is also strongly associated with the presence and severity of OSA (Genta et al., 2014). This could possibly suggest that digit suckers are at risk of developing OSA, which has been associated with significantly impaired quality of life, poor cognitive and social functioning, and high morbidity.

Another illustration of how a single finger in the mouth can affect oral health, facial morphology, airway function and negatively impact quality of life. Mr Vice Chancellor Sir, the face, the teeth and quality of life are indeed a "Threefold cord that is not quickly broken".

The Effect of Masticatory Muscles on Dentofacial Development
The masseter muscle is believed to play a significant role in determining the skeletal structures of the face, contributing to the aetiology of malocclusions and influencing the stability of orthodontic treatment (Pepicelli et al., 2005). The relationship between masseter muscle thickness (measured using ultrasonography), overbite values and cephalometric facial parameters in Nigerian pre-orthodontic treatment patients were therefore investigated.

Our study revealed that masseter muscle thickness was significantly higher in low angle subjects than in normal and high angle cases during both relaxation and contraction phases (Soyoye et al., 2018). MMT correlated positively with indicators of facial morphology like Jarabak ratio, ramus thickness and height and negatively with measurements like LAFH, FMA, MMPA, gonial angle. Additionally, MMT increased progressively with overbite depth suggesting a strong link between muscle thickness and facial structure (Soyoye et al., 2017). These findings support the opinion that thicker masseter muscles are associated with more convergent facial morphology while weaker muscles may lead to a more

divergent pattern. This relationship can be explained by principles such as Wolff's law and the Functional Matrix theory of craniofacial growth, which describe how bone adapts to muscle forces.

Research and Clinical Practice Nexus

One of the benefits of conducting research is the translation of research findings into practise for more efficient clinical management of patients. Fixed orthodontic appliances stand out as the main stay in comprehensive orthodontic therapy and is frequently provided to effectuate an improvement in aesthetics, psychosocial well-being and Quality of Life (QoL). We therefore conducted research on various aspects of fixed appliance therapy.

Evaluation of Tooth Dimensions of Orthodontic Patients

Many factors including reduced facial volume, tooth crown size, dental arch length loss, periodontal status, primary tooth loss, presence of third molar, as well as age and gender contribute to crowding, the most common single contributor to malocclusion (Cheng et al., 2018). Previous studies have investigated and compared tooth dimensions of Nigerians with other population groups (Otuyemi & Noar 1996; Adeyemi & Isiekwe, 2003; Ajayi et al., 2010) however, no study had compared orthodontic patients with controls.

The tooth dimensions of a population of orthodontic patient and a control group of non-orthodontic patients were compared (Kolawole et al., 2019). Maxillary and mandibular mesio-distal tooth dimensions were generally larger in the orthodontic than the control population, however, only the dimensions of maxillary central incisors, left lateral incisor and mandibular left second premolar differed significantly. Maxillary bucco-lingual tooth dimensions were significantly larger among the orthodontic than the control population. Mandibular bucco-lingual dimensions differed significantly for the right canine, left first and second premolars, and right and left first molars ($p < 0.05$). Our study identified that differences in tooth size between orthodontic

patients and controls were more evident in the maxilla. This information is significant in the clinical practice of orthodontics where tooth dimensions influence the decision for or against extractions to facilitate alignment and finishing of cases to ensure treatment stability.

Orthodontic Tooth Separation

Orthodontic separators are used in the interproximal contact points of teeth to create space for accurate and atraumatic banding during fixed orthodontic therapy (Kumar et al., 2014). An ideal separator should provide rapid and maximum separation with minimal separator loss and mild pain or little discomfort of normal daily functions. The fear of pain and discomfort associated with general dental and orthodontic care are regarded as key deterrents to orthodontic therapy.

We therefore investigated patients' pain perception, associated discomfort of normal daily activities (sleep, eating, social life, and school/work) the dislodgement rate and separation effectiveness of four types of orthodontic separators (dumbbell elastomeric, round elastomeric, stainless steel, and nickel-titanium metallic separators) during orthodontic tooth separation. The Semantic Differential Pain Scale (SDPS) and Discomfort Index Scale (DIS) were used for assessment.

Figure 17: Round and dumbbell separators in the mouth

The study demonstrated that dumbbell separators induced the highest pain, with a mean pain perception score of 2.54, followed by round (1.46), stainless steel (1.05), and nickel titanium

separators (1.04). With all 4 separators, patients experienced their peak pain at 48 hours post insertion, with the greatest discomfort experienced during eating. There were no effects of sex, age, and anatomical location of separator (mesial or distal, maxillary or mandibular) on pain and discomfort perceived and separator effectiveness. (Oshomoji et al., 2018a). It was also noted that dumbbell separators achieved the greatest mean separation effect (0.40mm), stainless steel (0.35mm), stainless steel (0.32mm), while nickel-titanium achieved the least (0.26mm). The dislodgement rates were determined as 7% for dumbbell, round 2%, stainless steel 0%, and 2% for nickel-titanium separators (Oshomoji et al., 2018b).

Our study findings will serve as a guide for orthodontists with separator selection. Dumbbell separators will be useful in achieving quicker and greater separation effects, when the patient's pain threshold is high, nickel titanium may be considered in patients with low pain threshold, while stainless steel separators should be considered when banding of teeth may be delayed for about a week, since the risk of dislodgement is minimal.

Bracket Loss during Orthodontic Treatment.

The prevalence of bracket loss among patients attending the orthodontic clinic of OAUTHC, Ile-Ife, was investigated through a retrospective study (Omoleke & Kolawole, 2014). It was observed that about two-thirds (70.3%) of patients had bracket loss during their treatment, with a prevalence of 23.5%. There was however no relationship between gender and bracket loss. Bracket loss progressively decreased with increasing age, also more brackets were lost in the mandible than maxilla, with the mandibular right quadrant exhibiting the greatest bracket loss (33.3%). Our findings are important as bracket loss is one of the orthodontist's worst nightmares which unnecessarily increases chairside time and prolongs orthodontic treatment.

Tooth Alignment during Fixed Orthodontic Appliance Therapy

The duration of fixed orthodontic appliance therapy is considered by many patients as relatively long which may discourage potential

patients from undergoing orthodontic treatment. Any method or intervention that leads to a reduction in the duration of orthodontic treatment is highly desirable (Tsichlaki, 2016). Extraction of first premolars is often carried out before fixed appliance therapy to create space for alignment of teeth. We therefore explored the effect of healing time of extraction sockets amongst other anatomic and socio-demographic factors on the duration of the tooth alignment phase in fixed orthodontic appliance therapy for patients with anterior segment crowding. (Olabintan et al., 2022) Extraction protocols were adjudged “recent” and “healed” when treatment was commenced within 3-7 days, and 5-6 weeks post-extraction respectively and patients were followed up for the first 16 weeks.

Figure 18: Orthodontic alignment in healed and recent extraction cases

Our investigation indicated that the mean daily incisor and canine alignment rates did not differ significantly between recent and healed extraction cases, males and females, and in the maxilla and mandible. A significant difference in the mean daily alignment rate was however identified between adolescents and adults. Age group was the only predictor of the alignment rate, duration of extraction, gender, and dental arch, did not predict alignment rate. Our finding of faster alignment rate in adolescents compared with adults aligns with the previous findings (Chugh et al., 2013).

Mr. Vice Chancellor Sir, through our research, we have documented findings that now serve as valuable clinical guidelines influencing fixed appliance therapy. It is imperative that we adopt practices that alleviate pain, reduce bond failure, minimize chairside and overall treatment time, and enhance treatment

outcomes. By doing so, we do not merely improve facial aesthetics and straighten teeth, we enhance well-being, and ensure that the quality of life of those entrusted to our care is not compromised but improved during their orthodontic journey. The face, the teeth and quality of life are an inseparable threefold cord!

Collaborations with other Specialties

Dental Erosion and Dentine Hypersensitivity

My interest in dental erosion and dentine hypersensitivity arose because it happens to be an oral health challenge which I also face. Dental erosion is characterized by the progressive loss of tooth enamel due to chemical processes not involving bacterial action. It is caused by the direct action of extrinsic acids from dietary sources or intrinsic acids from gastric origin (Shellis & Lussi, 2014). Dental erosion may therefore compromise orthodontic bracket placement, due to enamel loss, surface morphology changes, dentine exposure, etching and adhesion challenges apart from the additional risk of damage to the tooth during bracket debonding. The pain, sensitivity experience, and aesthetic consequences can also negatively impact an individual's self-esteem and quality of life.

In an extensive review of the literature of the determinants and control of soft drinks-incited dental erosion (Bamise et al., 2009), we highlighted that the erosive capacity of soft drinks, juices and foodstuffs is significantly associated with chemical factors. We noted that the phosphoric acid content of cola drinks reduces its erosive potential when compared with fruit juices that contain citric acid. The risk of erosion also bears a strong relationship with the amount, frequency and method of introduction of drinks into the mouth, drink temperature (worse when hot), dilution with water, practice of healthy lifestyle (dieting, fasting, exercise), oral hygiene practices, presence of dental plaque, and saliva composition.

An evaluation of the use of common extrinsic erosive agents namely soft drinks, fresh fruits, fruit juices and medication among

789 residential university students was performed (Bamise et al., 2009b). The Total Weight Value (TWV) and Use of Erosive Agents (UE) and Mean Value of Use for each erosive agent group were determined. Fresh oranges, Coke and Fanta, 5 Alive and Chewable Vitamin C were the most heavily used extrinsic erosive agents by the participants. This may not be unrelated to the relative availability of oranges and Coca Cola in and around the halls of residence.

We reported a case of a 49-year-old woman referred for tooth wear and sensitivity (Bamise et al., 2009). Intraorally, classical erosive lesions were observed on the bucco-gingival surfaces of the maxillary incisors, mandibular premolars, and the occlusal surfaces of the molars. History of inappropriate use of lime juice for weight control and hypertension with daily use of Lisinopril which could have induced xerostomia were volunteered. Our report corroborated previous assertions that excessive consumption of fruits and fruit juices in pursuit of a healthier lifestyles can be harmful.

Figure 19a: Erosive lesions on the labio-gingival surfaces of the maxillary incisor

Figure 19b: Erosive lesions on the bucco-gingival surface of the mandibular premolar

Dental Erosion in Children

Dental erosion also occurs in children, who are particularly vulnerable because of thinner enamel, which increases susceptibility to acid dissolution. The prevalence and pattern of dental erosion in the mixed dentition of 6 -12-year-old children was determined with the index of O'Sullivan. The prevalence of dental erosion was low (1.8%), among the 495 studied children. Primary teeth were predominantly affected (83.3%), with the

occlusal or incisal surface affected in 67% of cases. Loss of enamel with exposure of dentine and visible enamel–dentine junction was observed in 58.3% of the affected teeth, while about 67% of affected teeth had more than half of the surfaces involved. The great severity of erosion in the few affected however calls for concern and may indicate intense exposure to associated risk factors.

Tooth Hypersensitivity

Tooth hypersensitivity is defined as a short, sharp pain that arises from exposed dentine in response to thermal, evaporative, tactile, osmotic, or chemical stimuli, which cannot be ascribed to any other form of dental defect or pathology (West et al., 2013).

Tooth Sensitivity Experience among University Undergraduates

We investigated tooth sensitivity experience among 1019 residential university students (Bamise et al., 2010). The prevalence of tooth sensitivity was 68.4%. The majority described their discomfort as sharp pain, cold as the initiating stimulus, with drinking as the activity mostly interfered with. Use of hard toothbrush was a predictor of tooth sensitivity. Our finding highlighted that abrasive wear of the hard toothbrush, rather than erosive agents was the significant contributor to hypersensitivity among these students.

Beverage Drinking Habits and Tooth Sensitivity Experience among Adolescents

The recent increase in consumption of acidic beverages is thought to be the leading cause of dental erosion observed among adolescents. The drinking habits and tooth sensitivity experience of 582 secondary school adolescents was evaluated (Bamise et al., 2014). Soft drinks were the most consumed beverage (97%), predominantly by females (94.6%). Most of the adolescents (75.6%) obtained their drinks from home and mothers were identified as the relation who also consumed soft drinks frequently.

Participants that preferred drinks at normal room temperature and those who practiced long sipping (63.3%) had the greatest tooth sensitivity experience. Tooth sensitivity experience also differed significantly between those who swish their drinks compared with those that do not. Parents constitute role models for their children and therefore significantly influence their behaviour. Our findings show that the role of a mother cannot be underestimated as most adolescents reported the mother as the most common "accomplice" and the home as the source of soft drinks.

Clinical Management of Teeth with Pulp Canal Obliteration

Pulp canal obliteration (PCO) is a sequela of tooth trauma which patients with malocclusion features like protruding incisors and incompetent lips are particularly prone to. This may pose a management challenge to the clinician as all pathologies must be carefully addressed before the commencement orthodontic treatment to prevent root resorption and tooth loss. The clinical signs and symptoms associated with PCO, and the status of periapical tissues were assessed using the periapical index (PAI) as an aid to making treatment decisions (Oginni et al., 2009). Partial (56.9%) and total (43.1%) PCO was demonstrated in the study sample. The most common presentation was yellow discoloration of teeth (67.4%). Teeth with PAI scores < or =2 presented with occasional spontaneous pain, while those with scores > or =3 presented with signs and symptoms ranging from spontaneous pain, pain on percussion, slight swelling to sinus tract drainage. Our study findings indicate that endodontic treatment should be initiated in teeth with tenderness to percussion, PAI scores > or =3 and a negative response to sensibility testing.

Mr Vice Chancellor Sir, orthodontic treatment planning demands thorough diagnostic evaluation, guided by clinical expertise and sound judgment. The temptation to initiate treatment without consideration of all pertinent factors, including oral pathologies must be avoided. Optimal care may necessitate collaborations and the integration of adjunctive restorative procedures. Orthodontic intervention is justified only when it yields meaningful and lasting

improvement in facial and dental aesthetics, dental health, and overall quality of life.

THE BROADER HEALTH CONSEQUENCES OF MALOCCLUSION AND THE NEED FOR MULTIDISCIPLINARY APPROACHES IN HEALTHCARE

Orthognathic Surgery

Orthodontic treatment is indicated when the presence of malocclusion causes significant deviations in intramaxillary and or intermaxillary relations of teeth. However, when severe skeletal deformities exist, the goals of attaining acceptable occlusion, esthetics, and function are impossible to attain with orthodontic treatment alone, such cases are only amenable to orthognathic surgery (Alhammadi, 2022).

Deformities that require orthognathic surgery lead to functional impairments, psychosocial problems and a significant decrease in quality of life (Sen et al., 2024). Orthognathic surgery is becoming an essential component of modern orthodontic practice however, Nigerian studies have reported low utilization of orthognatic surgery (Isiekwe et al., 2016; Ogundipe & Otuyemi, 2018).

We reported the highlights of the collaborative effort between the Department of Oral Maxillofacial Surgery and the Orthodontic Unit of the Department of Child Dental Health at the Obafemi Awolowo University, Ile- Ife and the framework adopted for collaboration (Ogundipe et al., 2020).

From desk reviews of relevant publications, international and national guidelines for collaboration, we identified main themes as areas of collaboration, surgical–orthodontic team membership and description, surgical-orthodontic clinic, referral and diagnosis, mainstream surgical procedures with indications. The four key areas identified for collaboration were surgical orthodontics, orthognathic surgery, alternative orthognathic surgery and post-traumatic facial deformity. Subsequently we developed and

adopted a framework for improving surgical-orthodontic collaborative care of patients in our centre and recommended that other centres develop theirs taking into cognizance, their institutional peculiarities.

The functional need for orthognathic surgery among our orthodontic patients was unknown. We therefore evaluated the functional need for orthognathic surgery of an orthodontic patient population with the Index of Orthognathic Functional Treatment Need (IOFTN) and determined its relationship with the IOTN and DAI (Kolawole & Abdullai, 2024). The IOFTN provides a standardised, objective method for categorising the functional severity of dentofacial deformities. It was modelled after the widely used Index of Orthodontic Treatment Need (IOTN).

By applying this index, we sought to assess the proportion of patients requiring surgical intervention and to determine the nature of the functional problems exhibited. Angles class I malocclusion was predominant (77.6%) in the population. The functional need for orthognathic treatment was determined as 33.0% no need, 9.6% mild need, 10.6% moderate need, 36.2% great need and 10.6% very great need for orthognathic treatment. We found that increased overjet $\geq$ 6mm and $\leq$ 9mm, increased overbite with evidence of dental or soft tissue trauma and speech difficulties were the main indicators for orthognathic treatment need. The need for orthognathic treatment did not differ based on gender, however a significant difference was identified based on Angle's malocclusion type. Moderate significant correlation was observed between DHC of IOTN and IOFTN ($r = 0.411$), while DAI and IOFTN ($r = 0.376$) and AC of IOTN and IOFTN ($r = 0.303$) showed low significant correlations.

Table 7: Gender Distribution of Orthognathic Functional Treatment Need (IOFTN) of the Study Population

IOFTN Grades	Female N (%)	Male N (%)	Total N (%)	p value
No need for treatment (Grades 1&2)	24 (37.5)	16 (53.3)	40 (42.6)	0.068
Moderate need for treatment (Grade 3)	5 (7.8)	5 (16.7)	10 (10.6)	
Great need for treatment (Grades 4 &5)	35 (54.7)	9 (30)	44 (46.8)	
Total	64 (100)	30 (100)	94 (100)	

To the best of our knowledge, this is the first report of the functional need for orthognathic treatment in a Nigerian population. The high prevalence of severe malocclusion with functional orthognathic treatment need identified, underscores the importance of comprehensive orthodontic and orthognathic assessment and the routine use of standardised occlusal indices in the Nigerian orthodontic practice to ensure consistency and comparability of data.

Our findings serve as a justification for public health campaigns to educate the population about the importance of early detection and treatment of malocclusions. In addition, healthcare and education sector policies that recommend Government funding of orthodontic care through provision of subsidies and insurance coverage and support of specialised training for relevant professionals are long overdue.

Perhaps a more important implication of our findings is the need to advocate for multidisciplinary care of patients with dentofacial deformities. Affected individuals experience psychological problems and a significant decrease in their quality of life due to these challenges, which cannot be managed optimally by one specialty. Such coordinated care is likely to increase the utilisation of surgical orthodontic care which has been proven to significantly improve quality of life.

Practice of Sleep Medicine in Ile-Ife

The association between the craniofacial area, upper airway morphology and sleep related breathing disorders (SRBDs) is poorly understood and somewhat controversial. Evidence suggests a bi-directional relationship as craniofacial disharmony may both contribute to and result from SRBDs (Neelapu et al., 2017). Sleep disorders include the insomnias, sleep related breathing disorders, central disorders of hypersomnolence, circadian rhythm sleep-wake disorders, parasomnias and sleep related movement disorders (ICSD-3-TR, American Academy of Sleep Medicine, 2023). They involve problems with the quality, timing, and amount of sleep, which result in daytime distress and impairment in functioning. Adewole (2017) reported an increased degree of daytime sleepiness and decreased productivity resulting in reduced quality of life among adults with OSA in Nigeria. Children at high risk for sleep-disordered breathing are also characterized by reduced quality of life, reduced pharyngeal dimensions, palatal crossbite, and reduced dentoalveolar arch widths requiring multidisciplinary care (Katyal et al., 2013).

Sleep medicine is a rapidly growing field globally. The Sleep Study Group of the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC) Ile-Ife was constituted in 2018 on the initiative of Prof. Morenikeji Komolafe, and consists of Specialists in Neurology, Anaesthesia, Otorhinolaryngology, Oral and Maxillofacial surgery, Orthodontics, Paediatrics, Psychiatry, Respiratory medicine, Oral Medicine and Dermatology. The initiative which started as monthly seminars has metamorphosed to the Nigerian Sleep Society with the focus as advocacy and research for Sleep Medicine in Nigeria. The society is affiliated with the World Sleep Society. The maiden Scientific Conference and Annual General Meeting of the society held on April 30, 2025, with a keynote lecture, expert symposia and scientific presentation of 18 abstracts.

Recognising that information was lacking on the knowledge of Nigerian medical and dental students on sleep and the different

types of sleep disorders, we assessed the knowledge, interest and awareness of Nigerian medical and dental students about sleep medicine with the Assessment of Sleep Knowledge in Medical Education (ASKME) survey (Olorunmoteni et al., 2023). Among the 488 investigated students, about three-quarters (77%) had poor sleep knowledge. Sleep knowledge differed based on age, however year of study, and awareness about sleep medicine subspecialty and interest in sleep medicine were the predictors of sleep knowledge. Our results highlight the need to allocate adequate lecture hours to teach sleep medicine in the medical and dental curriculum to improve their knowledge.

In the contribution of a chapter "Current Practice of Sleep Medicine in Nigeria" to a book titled "The Practice of Sleep Medicine around the World: Challenges, Knowledge Gaps and Unique Needs" (Komolafe et al., 2023), the state of sleep medicine practice in Nigeria as well as the strengths, weaknesses, opportunities, and threats to the establishment of successful sleep medicine programs in the country were reported. The apparent rise in the occurrence of sleep problems in the Nigerian population was noted. The minimal involvement of orthodontists and oral and maxillofacial surgeons with sleep medicine practice in Nigeria was highlighted. We emphasized concerted and coordinated efforts to enhance the strengths and opportunities while minimising or eliminating the identified challenges.

Association between Sleep-Related Breathing Disorders and Malocclusion

Researchers have been able to identify abnormal craniofacial morphology and malocclusion traits present in individuals with sleep-related breathing disorders (Aroucha Lyra et al., 2020). We therefore determined the prevalence of SRBDs and examined associated malocclusion traits in a population of university undergraduates (Kolawole & Akomolafe, 2025). SRBDs were assessed using the Epworth Sleepiness Scale (ESS), STOP-Bang, and Berlin questionnaires. The prevalence of snoring was 31.1%, and 48.9% had pathological daytime sleepiness (ESS > 10). Most

participants (96.7%) were at low risk for Obstructive sleep Apnea (OSA) according to STOP-Bang questionnaire, while 3.3% were categorised as high risk. No participant met the high-risk criteria on the Berlin questionnaire. No significant gender differences were found with the occurrence of pathological sleepiness or OSA risk. Individuals with pathological sleepiness were more likely to present with convex facial profile, class II skeletal pattern, Angle's class II molar relationship, and lip incompetence ($p < 0.05$). Malocclusion features and severity did not differ based on OSA risk.

The high report of pathological sleepiness and its significant association with specific malocclusion features in the study population highlights the compromise in quality of life that can occur across multiple domains with the presence of malocclusion. Craniofacial disharmony contributing to or resulting from sleep disorders, can negatively impact cognitive, occupational, social, and emotional functioning, and increase the risk of physical health challenges, accidents, and occupational injuries. There is therefore a need for further multidisciplinary research to explore the role of malocclusion traits in the development and progression of SRBDs. Mr Vice Chancellor Sir, I humbly submit again, that the face, the teeth, and quality of life are a threefold cord that is not quickly broken!

Collaborations with Information and Communication Technology

We have also collaborated with colleagues in the Department of Computer Science and Engineering of the Faculty of Technology to develop a mobile application called the IFEORTHOCARE mobile app. It has a user-end that illustrates oral hygiene instruction using a validated video, which reminds patients about their oral hygiene measures and empowers clinicians to monitor compliance using feedback support in the form of a graphical display (Adesunloye et al., 2024). IFEORTHOCARE App usability was determined with the Post Study System Usability Questionnaire (PSSUQ). The App demonstrated a high degree of

performance and satisfaction, a superb usefulness level, good-quality information, and excellent interface quality. In addition, there was a greater reduction in biofilm accumulation with the aid of this application.

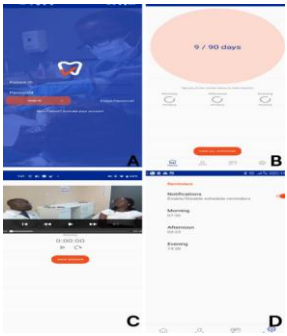


Figure 20: The interface of the IFEORTHOCARE App
(A) App's login page (B) Home screen showing calendar for tracking (C) Guide/Timer's screen showing an oral care video (D) Settings screen showing scheduled time for tooth brushing

More recently, we obtained a Tetfund Research grant for a Project titled Integration of Teledentistry Model into the Delivery of Oral Health Care Services in rural communities of Nigeria. Teledentistry is the remote provision of dental education, guidance, and treatment, using information technology instead of direct face-to-face contact with patients. (Fernandez, 2021). A teledentistry mobile application (app) is being developed for this project which will provide machine learning support and video conferencing facilities for prompt case diagnosis and patient care at two rural locations in Osun and Ondo states, with the goal of improving their oral health related quality of life.

SERVICE

Mr Vice Chancellor Sir, the responsibilities of an academic include teaching, research, and service. I have found teaching both fulfilling and rewarding, it has been a privilege to be able to impact generations of students. Beyond the call of the teaching duty, I have taken up the responsibility of parenting many of my students.

I have engaged with students and their parents on diverse issues and have acquired many children who call me mummy tenderly to the annoyance of my daughter. This has earned another nickname of Headmistress. It is always a delight to receive messages and calls from many of them in the diaspora updating me about their progress and appreciating the training they received here in OAU. I also serve as Staff Adviser to the Junior Chamber International Nigeria (JCIN) Obafemi Awolowo University, Ile-Ife Chapter.

I have also been privileged to pass on the training I received as the "Crown Princess" to others. I have supervised and co-supervised the thesis of many younger colleagues towards the award of the Fellowships of the West African College of Surgeons and the National Postgraduate Medical College of Nigeria, who are now specialists in orthodontics and are practicing in various locations in Nigeria and in the diaspora.

"Moreover, it is required in stewards, that a man be found faithful" (1 Cor 4:2, KJV). Shortly after joining the services of OAU, my boss Prof. Otuyemi went on sabbatical leave. I have since been saddled with the responsibility of coordinating the academic programme in Orthodontics and Dentofacial Orthopaedics. I have served as both Acting and substantive Head of the Department of Child Dental Health. During my last tenure as Head of Department, with the support of the Former Dean of the Faculty of Dentistry (Prof. Morenike Ukpong) and the aid of a TETFUND grant, we were able to acquire brand-new dental chairs for our Orthodontic Unit and equip our Orthodontics Laboratory.

I have served as the Deans representative at various Faculty Boards and Review Panels of Cognate Faculties. I have served in the Faculty Conference Committee since 2006. Prof. F. J. Owotade nominated me to serve as his Vice Dean during his tenure as Dean from September 2017 to May 2019. I also chair the University Relations Committee of the Faculty which facilitates engagements with other University faculties, students and structures.

I have also served in several Committees in the College of Health Sciences, including the Alumni Relations Committee in which I have served since 2011. I have been a Member of the Induction Ceremonies Planning Committee since 2008 and has served as the Chairperson of the Committee since 2021. I served as the Public Relations Officer, of the College of Health Sciences Obafemi Awolowo University Alumni Association from 2017-2021.

Services outside the Obafemi Awolowo University

I was appointed an Honorary Consultant in Department of Child Dental Health, Obafemi Awolowo University Teaching Hospital, Ile-Ife in 2005. Together with other colleagues, we have established an Orthodontic Unit which is renowned for rendering quality care. Our department has therefore become a Centre of choice for supernumerary resident doctors training in Orthodontics from various parts of Nigeria. I have seen to the procurement of materials for the day to day running of the Orthodontic Unit for decades, and currently serve as the Chairman of the Orthodontic Revolving Fund.

With the support of Grants from the Smile Train and the Noordhoff Craniofacial Foundation, I attended International Trainings on Surgical Techniques in Cleft Lip and Palate and Maxillofacial Surgery, and Surgical-Orthodontic Approach to Dentofacial Deformity at Chang Gung Craniofacial Centre, Taipei, Taiwan on several occasions between 2008 and 2014. Through the training acquired, I initiated and established the provision of pre-surgical nasoalveolar molding for children born with orofacial clefts which is the standard of care worldwide in the management of such patients, which hitherto was not practiced in our centre. I presented a summary of the clinical steps we employ for patient management at the TELECLEFT, WACS, Smile Train Online Lecture Series in 2021.

On the invitation of Dr. Dapo Afolabi, I assisted with the establishment of orthodontic services at the Federal Medical Centre, Owo. I have contributed to National and Global

orthodontic awareness to reinforce the presence of the specialty, the first elaborate celebration of the World Orthodontic Health Day in Nigeria, held here in Ile-Ife in May 2017, which I initiated and coordinated.

I have served as a Resource person at the Update Courses and Examiner for the Final Part II Fellowship Examinations of the West African College of Surgeons, Ibadan since 2014. I also served as External Examiner, at the B.D.S. Examinations, of the University of Lagos, Lagos State University (LASU), and the Kwame Nkrumah University of Science and Technology (KNUST) Kumasi, Ghana. I have served as External Assessor for the promotion of colleagues in other universities to the Professorial Cadre. I have participated in the accreditation exercises of the Medical and Dental Council of Nigeria and served as External Examiner at the Assessment Examination for Foreign Trained Medical and Dental Graduates.

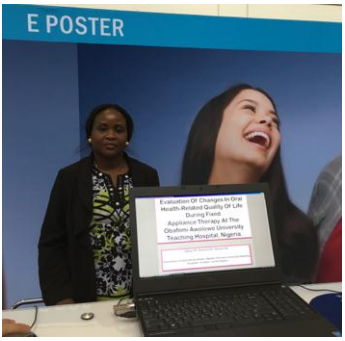
I belong to several professional bodies including the Nigerian Association of Orthodontists (NAO), British Orthodontic Society (BOS), American Association of Orthodontists (AAO), World Federation of Orthodontists (WFO). I have served as Assistant Secretary General of the Nigerian Association of Orthodontists. I am a member of the Board of Trustees of the Nigerian Sleep Society.

I joined the New Covenant Church Ile-Ife in 1994 on the invitation of my friend Dr. Abiola Adeniyi (nee Lawal) who had also been invited by Dr. David Olomu. Through the grace of God, I have had the privilege to be a co-labourer in the Lord's vineyard. I obtained a Diploma in Pastoral Ministry (Upper Credit) in 2002 and Diploma in Ministerial Studies (Upper Credit) in 2004 from the Covenant Bible College, Ibadan. I was ordained as a Reverend in July, 2013.

International Workshop on Surgical Techniques in Cleft Lip and Palate and Maxillofacial Surgery (Chang Gung Forum), Taoyuan Taiwan December, 2014

With Co- Speakers at the Tri-Regional Meeting of the International Association of Paediatric Dentistry (IAPD), January 2018

Poster presentation at the British Orthodontic Conference, Brighton UK, September, 2010



Poster presentation at the Annual Session of the American Association of Orthodontists Orlando, April, 2016

International Orthodontic Congress (WFO) London, UK, September, 2015

Annual Session of the American Association of Orthodontists. Washington D.C., May, 2018.

CONCLUSION AND RECOMMENDATIONS

Mr Vice Chancellor Sir, I have tried to highlight in the short time allotted to this lecture the central truth, that the face, the teeth, and quality of life are not separate concerns, but members of a profound kinship, the deeply interwoven strands of a threefold cord. Several of our research findings demonstrate that malocclusion may militate against oral and general health, and overall well-being, with evidence showing that improvements in quality of life accompany the receipt of orthodontic treatment. The role of Orthodontists in restoring aesthetics, function, health, and improving quality of life across the lifespan cannot be

underestimated. Based on these research findings, here are some of my recommendations:

1. Prioritisation of Oral Health: There is a need for early diagnosis, and interception of malocclusion. This is only possible if the Nigerian population gets screened from childhood. Federal Government needs to prioritise oral health by making oral health visits compulsory for the child patient.

2. Government Funding of Dental Education and increase in Dentistry Admission Quota: The number of Orthodontists that can provide specialised care to Nigerian population is grossly inadequate and cannot be met with the current admission quota for Dentistry in the few Universities where Dentistry is offered. The Federal Government needs to adequately fund existing programmes to facilitate an increase in admission quota, as well as establish more Dentistry undergraduate and Postgraduate Programmes across the nation.

3. Comprehensive and Standardised Orthodontic Evaluation: Findings from our studies underscore the importance of comprehensive orthodontic evaluation. This justifies the routine use of standardised occlusal indices in the Nigerian orthodontic practice.

4. Development of Culturally Sensitive Patient Reported Outcome Measures: The need for the development of culturally sensitive patient reported outcome measures cannot be overemphasized. I therefore recommend collaborations between Orthodontists, Psychologists and Psychiatrists to develop such measures.

5. Government funding of Orthodontic Care: The Government and healthcare administrators need to invest in the establishment of Specialised Centres for the management of malocclusions and dentofacial deformities, facilitate training and capacity building for orthodontists and oral and maxillofacial surgeons. Provision of subsidies and insurance

coverage to make orthodontic and orthognathic treatments more accessible are long overdue.

6. Advocacy for Multidisciplinary Care of Patients with Dentofacial Deformities: Individuals with functional need for orthognathic treatment are significant in number, underdiagnosed and undertreated. This calls for advocacy for multidisciplinary care of patients with dentofacial deformities which is inevitable for the successful management of such individuals.

7. Involvement of Orthodontists and other Specialties of Dentistry in Sleep Medicine: Orthodontists and orthodontic dental technologists facilitate the provision of mandibular displacement appliances required for the management of sleep related breathing disorders, however, this appears not to have been adequately explored in Nigeria. The high prevalence of pathological sleepiness and its association with specific malocclusion features in our population highlight the need for interdisciplinary management of sleep disorders.

8. The Role of the Family and Family Structure in Psychosocial Wellbeing and Adoption of Oral Health Behaviours: The role of family, especially the mother in the development of appropriate health behaviour has been demonstrated. Efforts should be made to ensure safe and stable home environments to facilitate development through primary socialization.

9. Promoting Exclusive Breastfeeding and Professional management of Oral Habits. Our research on oral habits justifies supporting and promoting exclusive breastfeeding. Efforts also need to be made to improve the public awareness about the availability of professional services for managing oral habits.

10. Integrating Psychology and Oral Health Education into the School Curriculum: I recommend the inclusion of Introductory

Psychology classes and instructions on oral health care into the secondary school curriculum, and the active involvement of schoolteachers in oral health education.

11. Addressing Appearance-Related Bullying to Safeguard Students Well-being and Academic Success: Data from our study on bullying prevalence are alarming and higher than UNESCO report of one in three students bullied by their peers at school. This requires the vigilance of school authorities to ensure that peer harassment does not affect school connectedness and academic achievement.

    Future research: our research works represent only a tip of the iceberg, I do not intend to rest on my oars, there remains a vast expanse of uncharted territory, offering numerous opportunities for further inquiry. Several of our study findings provide baseline data that can guide larger, national, and international multicentre studies. We will continue to ask questions, nurture interdisciplinary collaborations, and strive for outcomes that transform lives.

ACKNOWLEDGEMENTS

Mr Vice Chancellor Sir, while I was reluctant to come to Ile-Ife, by divine arrangement, Ile-Ife was destined to be home, and Ile-Ife has been home. It has been a land of expansion, a land described by some as arid and barren has been my fruitful land! Indeed, the Lord has made room for me and I have prospered in the land. Ile-Ife has been a conducive environment for learning, training and research, a safe arena for raising children, flourishing in academics and spiritual things. I made some of my best friends here in Ile-Ife for which I am eternally grateful.

"What shall I render unto the LORD for all his benefits toward me?" (Psalms 116:12, KJV) Words are insufficient to offer my sacrifice of thanksgiving to "The LORD, The LORD God, merciful and gracious, longsuffering, and abundant in goodness

and truth", My Stone of Help, hitherto have you helped me, I bow my head, I worship You!

I appreciate the wisdom and foresight of the founding fathers of this great citadel of learning, the past and present University Leadership for providing the conducive environment and platform for academic excellence. In the same vein, I appreciate the past and present Leadership and Management of the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC) Ile-Ife.

If I have seen further in research, it is by standing on the shoulder of giants (Isaac Newton). I acknowledge with many thanks the tutelage and guidance of an Academic Giant, Professor Donald Olayinka Otuyemi, whose sacrifices and dedication laid the foundation for my journey and whose example continues to guide my steps. Prof. Otuyemi is still actively initiating and conducting research as we speak. This moment is not for me alone, it is a tribute to the wisdom, patience, and investment of the one who taught me, and I make bold to say I was properly trained! May your generations be blessed.

I acknowledge with many thanks my teachers and trainers, Prof. Oluniyi Olusile and Prof. Segun Fagade of blessed memory, Prof. Eyitope Ogunbodede, Prof. Comfort Adekoya-Sofowora. I acknowledge all my senior colleagues in the profession, Prof. Oladapo Olasoji, Prof. Vincent Ugboko of blessed memory, Prof. Olawunmi Fatusi, Prof. Foluso Owotade, Prof. Kizito Ndukwe, Profs. Adeleke and Fadekemi Oginni, Prof. Morenike Ukpong, Prof. Temitope Esan who held my hands in the various clinics and taught me the practice of clinical dentistry. In the twilight of my beginnings, it was Prof. Morenike Ukpong who lit the lamp, read my earliest drafts, and guided my first steps into the realm of writing with grace and quiet strength, I am deeply grateful. I appreciate my dear friend and classmate, Prof. Tokunbo Bamise and my brother Prof. Michael Adedigba. I thank all my colleagues in the Faculty and Hospital especially those with whom I have

conducted research. I appreciate the entire academic and non-academic staff of the Faculty of Dentistry, OAU, Ile-Ife.

Behind every success there is a community of encouragement sacrifice and love, I appreciate specially Prof. and Mrs. Foluso Owotade and Prof. and Dr. Kehinde Oluwadiya. Prof. Owotade's office was home to my three children to support the baby friendly initiative, He was our lesson teacher through primaries and Part 1 Fellowship exams. I appreciate Dironkus, my buddy for life.

My heartfelt thanks go to my younger colleagues in Orthodontics, Dr. Fadeju, Brig. General Adesina, Drs. Osiatuma, Agbaje, Oshomoji, Soyoye, Yahaya, Njokannma, Olabintan, and Adesunloye. Deep appreciation to all past and present Residents, Supervisees, numerous students, and the many children Obafemi Awolowo University has given me. Gratitude is due to the generations of Dental Surgery Assistants who have helped to ensure that patients are efficiently cared for, I thank all serving and retired members of staff of the Dental Centre, Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife.

I wish to express my gratitude to the National and International Leadership of the New Covenant Church, and my Spiritual Fathers and Mothers, Rev. and Rev. (Mrs). Femi Soetan, Rev. and Rev. (Mrs). Abimbola Oladipo, Rev. and Rev. (Mrs). Remi Ogunfowokan, Rev. and Rev. (Mrs). Bayo Amole, Rev and Mrs. Bode Balogun, Rev. and Rev. (Mrs). Adewale Adisa. I appreciate my brethren in the Church, thank you for your love and prayers.

No expression can truly capture my sincere gratitude to God for my late father, Pharm Ayoade Bamimore. His love, discipline, tutelage, guidance, and depth of wisdom were unmatched. Daddy had too many rules: no mediocrity, a university degree in a Nigerian Ivy league was the minimum, no inter-tribal marriage, in summary no nonsense. He would say "Nibo l'aye apala nbe n'ilu Oyinbo" "no room for apala music abroad". I appreciate my loving, doting, gentle, wise, and hardworking mother, Deaconess

Eyitayo Bamimore JP, small but mighty. I thank God for preserving your life to witness this day. Mummy's catch phrase was "Ma da seria fun e" meaning "she will discipline you with tough Sharia rules" there was indeed no hiding place with both! They however realised that all work and no play was also unhealthy; they made sure hard work was balanced with leisure. I remember with nostalgia and have documented with photographs, some of our numerous leisure trips. Blessed indeed is your womb, and the paps that I sucked. The book of proverbs closes with an acrostic poem describing an "excellent woman", I wonder if King Lemuel had met my mother!

I have had the privilege of having more than one mother. I acknowledge with gratitude my fashionista Egba Mother, Mummy Yewande Ekundayo, my mother's best friend of 67 years and my mother for the past 37 years. I am deeply thankful to the Parents God gave me by marriage, Emeritus Prof. Lawrence Babatope and Mummy Eunice Adejumoke Kolawole (Signora), I thank you for your love and support. They say you do not choose your in-laws but if I had been given the choice, I would still have chosen you. I truly could not have asked for better. I recognise the contributions, love, and prayers of my many Aunties and Uncles (living and of blessed memory), cousins and the extended Bamimore and Ajao families.

To my beloved siblings, Omolara, Ayotunde, Olabolanle and their children Ayotimi, Toluwanimi and Ayotoni, your kindness has been a quiet strength in my life. You have been my first friends, my gist partners, and my lifelong supporters, thank you for cheering me on. I appreciate Ayotunde specially, for flying all the way from the United States of America to be here today. Your presence speaks louder than any words, and I am deeply grateful. This moment is mine, yes but it is also a tribute to the family that has always held me up. I am blessed to have acquired more brothers and sisters, I acknowledge with many thanks my siblings in love, Oluremi and Olabode, Babatunde and Oyenike, Babalola and Bolarinwa, Tokunbo and Eyiwunmi and the Kolawole football team.

I have been privileged to journey through life with a special group of ladies, the FGGC Sagamu Alunmi, especially the 82-88 set, and the IFEMED '95 Medical and Dental Class. I thank you all. To my treasured friends, those who have graced this occasion physically and those who are far away and have joined us virtually, thank you for standing with me in love and in celebration. I thank the Inaugural Lecture Planning Committee for your kind assistance and support.

One of the benefits of providing orthodontic care is that you get to interact with patients for several years. Many of my past and present patients have also become members of my family and are present with us today. I thank and appreciate you all.

My warmest appreciation goes to the wonderful children God gave me to raise, Babatope Ayomide, Ayokunmi Temitope and Ayomikun Opemipo. Thank you for being pure joy, peaceful and walking this journey with grace. I am proud to be your mother, may your paths shine brighter and brighter.

Gratitude overflows as I recognise my dear husband, Babatope Ayodeji, the gentle force that altered the course of my life. If I had not married you, I probably would not be in academia at all! Sharing life with you has been one of God's greatest gifts to me, a journey of shared purpose, quiet strength, and boundless grace. Thank you for your leadership, sacrifices and support, thank you being a role model I can emulate in all things. You know that I love you!

After all is said and done, I am mindful that it does not all end here, Apostle Paul said in 1 Corinthians 15:19 "If in this life only we have hope in Christ, we are of all men most miserable." Beyond the attainments here, my greatest life attainment has been Christ in me the hope of glory. I have a hope of glory, I have laid hold on eternal life. I admonish you to pursue this hope that you may also lay hold on eternal life.

Mr Vice Chancellor Sir, Distinguished ladies, and gentlemen, I thank you for your attention.

You're worthy of it all,
You're worthy of it all,
For from You are all things,
And to You are all things,
You deserve the Glory!

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