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African American Soft Tissue Analysis

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AFRICAN AMERICAN SOFT TISSUE ANALYSIS

by

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AFRICAN AMERICAN SOFT TISSUE PROFILE ANALYSIS

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ABSTRACT

This study was designed to quantify African American soft tissue normative values based on Arnett's soft tissue cephalometric analysis. Arnett's STCA is based on a sample of "esthetically pleasing" Caucasian individuals who were selected by one investigator. To obtain an African American sample of "esthetically pleasing" individuals, a survey was conducted using profile photographs of 43 African American orthodontic patients whose pretreatment orthodontic records met the following inclusion criteria; Class I molar relationship, 18-35 years of age, no skeletal deformaties or syndromes, and a pretreatment cephalometric radiograph. Forty African Americans evaluated the profiles and completed a questionnaire about their age, gender, education level and whether or not they had any dental training. The preference of each rater for each of the 43 profile photographs was scored on an attached visual analogue scale. The influence of the gender, education, and any previous dental training of the raters, when statistically evaluated, indicated that these parameters were not a factor in their ratings of the African American profiles. The 16 profile photographs which received the highest ratings were used in the present study as the "esthetically pleasing" group.

All pretreatment lateral cephalometric radiographs were digitized based on Arnett's STCA. STCA values were found for the "esthetically pleasing" African American sample and for the present study's entire African American sample. Results

show that African American STCA values differ from Caucasian STCA values, African Americans tend to have more protrusive incisors, more protrusive lips, smaller nose projections, and greater menton thickness. The African American STCA values found in this study can be used as a guide when planning treatment for African American patients.

DEDICATION

To my husband, Brett, for his love and continued support throughout my educational journey. To my daughters, Ansley and Baylor, for their patience and understanding while I was away from them to work on this thesis. To my Mom and Dad, for without their guidance, I would not be were I am today.

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LITERATURE REVIEW

Facial esthetics has been studied extensively over many years. The perception of beauty is innate and is formulated from an individual's cultural bias and preference. Facial features and their orthodontic implication have been under scrutiny from the inception of the profession. Many have tried to determine the "normal" values that clinicians try to achieve, however, definitive normative values that can be applied to every patient does not exist. Since we do not have patient specific orthodontic facial values for each individual who is treated, the orthodontist needs a scaffold of fundamental principles to help guide them in their treatment planning, which means treating towards "average" normative facial measurements for that specific ethnic group.

Historical Perspective on the Study of Esthetics

Esthetics is a subject of interest to many. Before arriving at a contemporary concept of facial esthetics, it is important to study the subject from a historical perspective. Art museums exemplify that the concept of beauty has been around since the beginning of time. The first recorded esthetic attitude was not recorded in art until about 5,000 years ago via art from the Egyptian culture in the Nile Valley.[1] They were the first to use stone to capture facial resemblances. Peck and Peck[1] contended that Egyptian art encompassed their concept of esthetics. The artifacts that remain from the royalty found in tombs and monuments show what they perceived as beauty. The

Egyptian culture was particularly interested in harmony, proportions and beauty. However, the artifact had a somewhat vague resemblance of the actual person. The Egyptians preferred a sloped forehead with a round broad face, large eyes, thick lips, and mild chin. Interestingly, bimaxillary dentoalveolar prognathism was common in that culture and with most of the Old Kingdom sculptures. Anthropologist have studied the ancestry of the Egyptians and found that the Nile Valley swamps were originally colonized by people from Africa and Asia. Therefore, at the peak of the Egyptian civilization, the Egyptian population was a mixture of Caucasian Asian stock and Negroid African stock.[1]

The Greek culture is the first to have facial beauty sensitively expressed through sculpture and philosophy. Both Plato and Aristotle felt that attractive objects respected certain geometrical rules, since true beauty necessarily demonstrated harmony.[2] During the fourth and fifth centuries B.C., which is also known as the Golden Age of Greece, Grecian sculpture flourished. Rules were proposed for congruent anatomic relationships and superlative bodily proportions in depictions of mankind.[3] In sculpture, the Greek profile has an anteriorly prominent forehead that sweeps slightly to the nose tip. A deep mentolabial sulcus is also evident.

Interestingly, many of the early orthodontists considered the Greek sculpture facial esthetics ideal. The father of orthodontics, Edward Angle, stated that the study of orthodontia was indissolubly connected with art as related to the human face. Angle admired the Greek ideal of beauty and thought that Apollo Belvedere was the epitome of facial beauty and that "every feature is in balance with every other feature."[4] In his paper, "Treatment of the Malocclusion of Teeth", he states that human faces were alike,

yet they differed. He referenced how artists have historically tried to find a basic line or principle from which to detect variations from normal and have failed. He holds that instead of seeing if lines of a face conform to a certain standard, see if the features of an individual are in harmony with each other. Two other orthodontist who agreed that facial esthetics encompassed by the Greeks was ideal were Calvin Case and Lischer.[5,6]

After the Greeks, the Romans are noted to document more individualized beauty. Their sculptures were very lifelike and represented the individuals quite accurately. The head of Augustus is an excellent example. After the Romans, it wasn't until the Renaissance period that esthetic values resurfaced. Michelangelo's *David*, which was completed in 1504, is a classic example. David's face is proportionate and natural looking. Art since the Renaissance period has gone through cycles of abstract representations to concrete representations.[1]

Our concept of esthetics today is shown in Hollywood, on TV, and in magazines. While it is different from ancient concepts, today's esthetics is still streamlined with facial harmony and symmetry.

History of Esthetics in Orthodontics

In the orthodontic community, there seems to be paradigm shifts occurring on the importance of esthetics in treatment planning. The leading orthodontist of the nineteenth century, Norman Kingsley, thought that esthetics was very important and was a definite objective in treatment. In his philosophy, occlusion followed esthetics. Then as the twentieth century progressed, Angle developed his philosophy where occlusion was the primary objective. Angle felt that if the teeth were in good occlusion, then the facial

esthetics would also be coincident.[7] Orthodontist who followed him then disagreed with this concept and challenged his nonextraction philosophy. Edmund Wuerpel[8] notes in his paper, *On Facial Balance and Harmony*, that he questioned Angle on a patient he treated because of the esthetic outcome. Angle was proud of his treatment outcome of this patient, but failed to look at the patient's face. He obtained a good dental relationship, but at the expense of her profile. Wuerpel stated that Angle, after realizing that he made her appearance worse, said, "then there is more to be thought than mere occlusion."

Case[5] and Lischer[6] also believed that it was not only impossible, but impractical to adapt one standard to everyone. Calvin Case[9] went on to study profiles based on facial casts of his patients. Following Angle's era, philosophies changed once again to rebirth the concept that esthetics was a concern.[7] Society today is more esthetically aware, in part due to the mass advertisements of "cosmetic" procedures. Lay people are more versed on the ability to correct esthetic concerns and, in turn, seek treatment. The chief complaint from most patients presenting to orthodontic offices is usually an esthetic issue. In dentistry, the advent of composite restorations, Invisalign, and ceramic brackets has made correction of esthetics even more popular.

Facial Preference

The question to be answered is what does contemporary society consider to be beautiful? Society today is a melting pot of different ethnicities with a wide horizon of experiences and backgrounds. Is it possible to come up with an exact concept of what is considered esthetic today? This question was asked by Alton Moore[10] in his paper, "A Critique of Orthodontic Dogma." He stated that "disagreement between orthodontists in

their concepts of what constitutes facial esthetic improvement accounts for many of the differences of opinion when treated results are evaluated. In some instances what is pleasing esthetically to some is displeasing to others." Moore also stated how he believed that esthetic values could not be measured because they are culturally conditioned and therefore subject to change.

Facial preference is developed in the early years of life. Just think about toys that children play with. Little girls are surrounded by different princesses who are all flawless and beautiful. Little boys play with different heroes who all exhibit strong masculine features. Villains are all represented as grotesque and unsightly. Then, unfortunately, as a child enters the teen years they are subject to the dogma of beauty from mass media.[11] A study by Dion[12] showed that when children aged 3 to 6 were asked who they would want as friends, they would choose more attractive pictures of people.

Does the mass media always produce icons that will determine what orthodontists think is esthetic? On the contrary, Richard Riedel[13] reports a study that he did in 1947 that compared Hollywood female "star" profiles to persons with normal occlusions. He submitted these profile tracings to various orthodontists in the Midwestern United States.. He concluded that the "stars" were not judged anything beyond "fair" from the orthodontists' opinions, and that most of the "stars" were judged as too protrusive.

Modern concepts of facial esthetics obviously are subjective. More current orthodontic literature has published papers that study esthetics from the viewpoint of laypeople. Papers have been written on whether or not facial preference is perceived the same between orthodontist and the general public. Some authors even suggest that because lay people are not adapted by orthodontic propaganda, they give a more unbiased

opinion and therefore a much better opinion of the esthetic profile.[1] In 1957, Richard Riedel[13] compared Seattle Seafair princesses' headfilm measurements to standards based on previous studies performed by orthodontists. His results showed that the public's concept of facial esthetics was in harmony with standards created by orthodontists.

One study performed in London[14] also showed that there was a common opinion on what was esthetically pleasing facially. This study had twelve different facial pictures of women aged 22 to 25 published in a London newspaper. All different facial types were represented. The article asked for people to respond and rank the twelve photos according to their "prettiness". Nearly 4300 people responded and each response was correlated to the sex, age, and occupation. The results showed that there was commonality in what was judged as "pretty" and this was common in all areas of England and among men and women.[14]

This same latter study was later performed in the United States by Udry.[15] He used the exact same twelve photographs used in the London study and received over 100, 000 responses. Interestingly, there was a correlation in who was esthetically pleasing among the American respondents and also among the American and British respondents, with the top three choices being the same.

Cox[16] studied facial harmony by analyzing silhouette profiles. He used a total of eighty seven male and female profiles and asked ten orthodontist and ten lay people to esthetically classify them. His results showed that there was no significant difference in esthetic opinion among lay people and orthodontists.

Profile Preference

In 1950, Richard Riedel[17] published a paper about esthetics and its relation to orthodontics. He realized the importance of esthetics and that esthetics effected orthodontic diagnoses and treatment. He wanted to evaluate what constituted a "poor" and a "good" profile and from those profiles to analyze their underlying dental and skeletal patterns. Riedel used profile outlines from cephalometric headfilms of twenty eight children. He asked a total of seventy two orthodontists to rate these profiles as either "poor", "fair", or "good". He found that there was an overall consistency of opinion among orthodontists and that there was actually greater agreement as to what was a "poor" profile than what was considered a "good" profile. Riedel's results indicated that the underlying dental and skeletal pattern of an individual is related to the profile. "A point", upper incisor, lower incisor, "B point", and pogonion were the hard tissue points in the "good" profiles that were harmonious to each other. The profiles that were deemed "good" had dental protrusion and had skeletal components that were arranged in a straight line. The "poor" profiles had dental protrusion and convex skeletal patterns.

Lines, et al[18] published a study that compared profile preference for men and women. They also used silhouette profiles of both men and women. Since they were silhouettes, the viewers could not distinguish whether the profiles were male or female. Three hundred and forty seven individuals who possessed a range of esthetic training evaluated these profiles. The participants included medical and dental students, oral surgeons, orthodontists, dentists, dental hygienists, and nonprofessional people. They were asked to choose the best general profile, the best profile for a man, and the best

profile for a woman. The same profile could be used for all three categories if the participants desired. The results of the study are very interesting. There was a statistically significant difference in the ideal profile choice for a male and female. For a female, the evaluators preferred a profile with fuller lips and fuller dental areas, a chin that fell on a plane with the upper and lower lip, and a less prominent nose. For a man, the evaluators preferred a profile that had more chin prominence than females and also a more prominent nose in relationship to their chin. When comparing the individuals who rated the profiles none of the differences were statistically significant. However, interestingly the orthodontists preferred both women and men to have fuller lips than oral surgeons. Orthodontist also differed from all the other groups in that they preferred men to have larger noses. Oral surgeons preferred longer columneller lengths and more prominent chins than all of the other participants. The authors of this study also noted that the profiles found desirable by the participants in their study correlated with those standards of Greek sculpture during the Golden Age. All facial angles fell within five degrees of the study mean, except the nasolabial and mentolabial sulcus being more acute in the Greek profile than in the study sample..

De Smit and Dermaut[19] also performed a profile analysis, but on artificially constructed silhouette photographs. They used nine profile types that represented the characteristics of the types proposed by Sassouni.[20] In addition, they altered the dorsum of the nose to give three types of noses. In their study they had two groups judge the profile. One group of evaluators had no orthodontic background while the other had some training in orthodontics. Results from their study indicated that neither the degree of orthodontic training nor the sex of the rater had any significant influence on what they

rated as esthetically pleasing. Both groups of raters also had similar profile choices for both males and females. Interestingly, the altering of the dorsum of the nose did not change the raters' preference value as well. The most preferred profile in the latter study was the Class I profile followed by the Class I deep profile. The least favored profiles were the open type profiles.

A different method of analyzing profiles was conducted by Tufekci, et al.[21] They compared how individuals felt about their own personal profile and then how two different orthodontists rated the participant's profile. The results showed that on average people were happy with their profiles. The people who were not happy with their profiles were individuals with Class II or Class III profiles. The profile evaluation between the orthodontist and the participants showed an agreement of only 53%. Of interest is that agreement between the two orthodontists was only 60%.

Ethnic Variation

Ethnic groups obviously possess a wide range of facial architecture. Studies have been performed to try and identify exactly how and where facial architecture differs among races. Different ethnicities have also been examined to see whether there is a variation in esthetic preference among the races.

Edward Foster[22] performed a study to see if different races preferred different profiles. He took a profile from a cephalometric headfilm of an eighteen year old Caucasian female and altered the photo to give seven different profiles. He only changed the lips in two millimeter increments in each photograph. He asked six different groups of people to pick a profile out of the seven profiles that would represent an eight year old,

a twelve year old, a sixteen year old, and an adult. The groups of evaluators were asked to pick one profile for both males and females. The six different evaluator groups were made up of art students, orthodontists, general dentists, a Chinese lay group, an African American lay group, and a white lay group. Foster's results indicated that all of the groups, even though very diverse, appeared to have the same standard of esthetics for lip posture within a one to two millimeter range. Each evaluator group preferred adult females to have fuller lips. Each group also chose the younger ages to have fuller profiles for both males and females.

Chan et al[23] published a paper on Caucasian perspective of Asian-Chinese profiles. They had one male profile and one female profile that were morphed so each gender had seven different profiles. They had a total of one hundred forty two evaluators assess these morphed profiles. These examiners were either dental students, orthodontists, or lay people. The examiners were asked to rank the seven profiles from one, being the most attractive, to seven, being the least attractive. The evaluators were then asked what part of the profile determined the rank they chose for the profiles. The results indicated that all three evaluator groups preferred the normal Class I or bimaxillary retrusive profile for Asian Chinese males and females. Results also demonstrated that in this study, the examiners noted that the feature that made them choose the rankings of the seven profiles was the chin and upper and lower lip areas.

Mantzikos[24] evaluated Japanese preference of the Japanese profile. He wrote how it was important to see if the profile that Japanese people preferred conformed to the Caucasian preferred profile. His results showed that the panelists preferred the orthognathic profile followed by the bimaxillary retrusive profile. In his discussion of

these results he stated that the orthognathic profile was not a conventional profile of Japanese people. He explained that this orthognathic profile was probably chosen as the most attractive due to the influence of the mass media and the stereotypes of movie stars.

Sushner[25] evaluated the soft tissue profile of African Americans and compared them to the standards developed by Holdaway, Ricketts and Steiner. He had a panel pick the most attractive one hundred people from five hundred subjects. Sushner never clearly explained who made up his panel, except that the judges were at "different social status levels." His results indicated that compared to the Caucasian profile, the African American profile was more protrusive. He also found that the African American male profile was more protrusive than the African American female profile. Sushner's final claim was that the values established by Steiner, Ricketts and Holdaway were only applicable to the Caucasian patient.

Thomas[26] assessed the soft tissue profile of an African American woman from an orthodontist's perspective. Thomas had fifty eight Caucasian and twenty eight African American male orthodontists assess ten different profiles that were based off the facial types described by Sassouni.[20] Thomas compared the preferences of the African American orthodontists to the Caucasian orthodontist and found that the three most preferred profiles were the same. Interestingly, the last three least attractive profiles selected by all of the orthodontists were also the same. He Thomas explained this outcome as the result of orthodontists having similar professional backgrounds.

In a companion study to Thomas's study, DeLoach[27] used the same 10 profile images used by Thomas and had African American women who had no dental education

judge the profiles. His results showed that the lay people agreed on the three most preferred choices from Thomas's study.

Polk et al[28] used the same profile silhouettes as DeLoach and Thomas and asked one hundred and fifty African Americans to rank these profiles. In addition, Polk et al asked the participants to pick one of the ten profiles that most resembled their own personal profile. Results indicated that African Americans did like fuller profiles, but their best choice was a flatter profile that was similar to the Caucasian norm. The results also indicated that a large number of participants could not correctly select their profile category. A study by Pitt et al[29] also found that people have difficulty in correctly identifying their personal profile type, but could recognize digressions from normal profiles in other people.

Scavone et al[30] compared Caucasian profile values proposed by Arnette[31] to the average profile values he found for Japanese-Brazilian adults. He used profile pictures of thirty men and thirty women with orthognathic profiles. Their ages ranged from eighteen to thirty. His results showed that there are distinct differences in the soft tissue values between Caucasians and Japanese-Brazilian adults. Both Japanese-Brazilian men and women had more anteriorly positioned glabella, more obtuse nasolabial angles, and smaller nasal projections than the Caucasian values. Japanese-Brazilian men also had larger protrusion of the lips and projected soft tissue B points than Caucasian men. His discussion states that the values he found for Japanese-Brazilian adults are not strict values to strive for when treating this population. Rather, the values would help guide orthodontists and oral surgeons in their treatment planning.

Soft Tissue Analysis

For many years, orthodontist have been using cephalometrics to aide them in hard tissue diagnosis and treatment planning. Measurements of hard tissues were analyzed by Downs[32] to evaluate what the difference was between acceptable and non-acceptable profiles. Tweed used his diagnostic triangle as a treatment planning tool. When patients are reviewed who were treated under this philosophy, it became apparent that in some instances, the incisors were in good position at the expense of the lost support for the lips or the increased vertical dimension. Newer cephalometric analyses continued to evolve after Tweed.[33] The trend in the 1950's and 1960's was to have the lower incisor close to the A-pogonion line.[34] Limitations of use of this measurement were then found.

There are at present multiple cephalometric analyses proposed, resulting in a variety of diagnoses and treatment plans for the same patient. Wylie[35] examined five different cephalometric analyses and found that treatment planning was in agreement only 40 percent of the time, therefore concluding that the primary diagnostic tool for orthodontics needs to be beyond cephalometrics.

Several soft tissue lines and angles have been developed. Merrifield[36] derived the Z angle and stated that this along with the profile line helped describe the lower face. The S line, which runs from the middle of the nose to the soft tissue pogonion was developed by Steiner.[37] According to Steiner, lips should touch the S line. Ricketts[38] developed the E line as a reference for where the lower lip should be. The E line runs from soft tissue pogonion to the tip of the nose. He stated the lower lip should be 2mm posterior to the E line. Schneideman et al[39] evaluated the lower face by dropping a

vertical line through subnasale. They measured the chin and lips to this line and also looked at vertical soft tissue associations.

Holdaway[33,40] noted that in order to adequately treat a patient, the clinician must look beyond the hard tissues. He developed a soft tissue analysis to demonstrate the inadequacies of only utilizing a hard tissue analysis. His goal was to develop a treatment plan that would not adversely affect the patient's profile. Holdaway preferred a facial angle of 90 degrees +/- 7 degrees to quantify the profile chin position, a nasal prominence of around between 14-24mm, a superior sulcus depth of ideally around 3mm, a soft-tissue subnasale to H line of around 5mm, a lower lip to be approximately 0.5 mm in front of the H line, and approximately 10-12mm of soft tissue chin thickness. Holdaway's soft tissue analysis also considers skeletal profile convexity, basic upper lip thickness, upper lip strain measurement, and the H angle. Holdaway later expanded his soft tissue analysis to develop his visual treatment objective (VTO) to predict desired treatment results. The VTO first establishes the desired profile and then estimates the orthodontic movement required to produce the profile goal. Holdaway's VTO, determines the soft tissue lip contour based on the Holdaway Line (H line). The H line is drawn from the clinicians experience. To aide practitioners in drawing the lips, Jacobson and Sadowsky[41] developed a soft tissue lip template.

Arnette and Bergman[42,43] evaluated the facial keys to orthodontics diagnosis and treatment planning in a two part article. They cited how treating an individual based on the dentoskeletal presentation without taking into account the face could lead to esthetic problems. They state how facial soft tissue imbalance can be present without any dentoskeletal disharmony. To prevent detrimental soft tissue results, Arnett and Bergman

presented nineteen facial keys as an adjunctive tool for treatment planning. They claim that by using their analysis, orthodontists can identify which tooth movements to avoid resulting in better predictability of facial outcome. Their analysis will also show the degree of the skeletal problem that exists. If the skeletal problem is too severe to be corrected by orthodontics alone, then surgery might be indicated. To do their facial diagnosis, Arnett and Bergman[42] position the patient in natural head position, centric relation and relaxed lip posture. They prefer natural head position because they consider that it is more accurate than intracranial landmarks. They note that patients do not walk around with Frankfort horizontal parallel to the floor and therefore Frankfort horizontal should not be used to dictate head posture in treatment planning. Since skeletal deformities can sometimes be masked by soft tissue compensations, it is important to have patients in their relaxed lip position.

Arnett and Bergman's[42,43] two part facial analysis article also addresses the fact that there are, indeed, many different normative values present in different facial studies. They list seven reasons for this inconsistency and are as follows; populations within the studies have different racial origins, studies were not unified in the type of occlusion present, lip posture was not consistent, natural head position was not always used as a reference, not all values were from cephalometric radiographs, exact measuring of the same trait is not always the same among studies, and some studies did not use only adult patients. These inconsistencies make it very important that each patient be evaluated by an analysis that is appropriate to that patient's age, lip posture, race, and head orientation. Orthodontists must bear in mind that these analyses are present only as an aide in treatment planning. According to Arnett and Bergman, three main factors should be

ascertained for the formulation of the best treatment plan. These factors are looking at the quality of the presenting facial traits, deciding how tooth movement will affect these existing traits, and deciding what type of surgery would be indicated when needed.

Arnett et al[31] carried out a soft tissue evaluation of forty six Caucasian adults based on the philosophy of Arnett and Bergman's two part facial keys article. Each patient was in natural head position, centric relation, and had relaxed lips. One investigator decided if individuals met the inclusion criteria of "facial balance". Metallic markers were placed on the following midface structures; orbital rim, cheekbone, subpupil, alar base, and neck throat point. Cephalometric headfilms were then taken and the True Vertical Line (TVL) was drawn through subnasale perpendicular to natural head position. From these forty six radiographs, normative values and standard deviations were developed for dentoskeletal factors, soft tissue structures, vertical lengths, TVL projections, and facial harmony. Results showed no difference in dentoskeletal factors between females and males. Males had greater soft tissue thicknesses, whereas females had greater protrusion of the lips. Males had longer faces and females had more incisal exposure. TVL projection measurements for the cheekbone, orbital rim, upper incisor, lower incisor, and subpupil were larger in males. Harmony values were also different between the genders.

Bergman[44] presented a soft tissue facial analysis based on cephalometrics to correlate with the previous article. He also emphasized how iatrogenic harm to a face could occur by only treating the malocclusion. He cautions orthodontists to look beyond the dentoskeletal pattern in evaluating disharmony of the face due to the soft tissue only being partially dependent on the skeletal arrangement. He discusses eighteen facial traits.

His soft tissue profile angle differs from Holdaway's in that it is formed by soft tissue glabella, subnasale, and soft tissue pogonion. Bergmann's other soft tissue measurements include nasal projection (measured from subnasale to the nasal tip) approximately 15mm, nasolabial angle approximately 102 degrees (he states that surgery and orthodontics can affect this angle and that it is also used to evaluate the maxilla in a anteroposterior position), lower face percentage of approximately 55 percent, upper lip length about 21mm, upper lip thickness of 12mm, upper lip approximately3.5mm anterior to subnasale-pogonion line, superior border of lower lip to soft tissue menton to be approximately 47mm, lower lip thickness around 13mm, lower lip approximately 2mm anterior to subnasale-pogonion line, soft tissue B point to be approximately 4mm from the subnasale-pogonion line, and approximately100 degrees lower face-throat angle.

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Abstract

This study was designed to quantify African American soft tissue normative values based on Arnett's soft tissue cephalometric analysis. Arnett's STCA is based on a sample of "esthetically pleasing" Caucasian individuals who were selected by one investigator. To obtain an African American sample of "esthetically pleasing" individuals, a survey was conducted using profile photographs of 43 African American orthodontic patients whose pretreatment orthodontic records met the following inclusion criteria; Class I molar relationship, 18-35 years of age, no skeletal deformaties or syndromes, and a pretreatment cephalometric radiograph. Forty African Americans evaluated the profiles and completed a questionnaire about their age, gender, education level and whether or not they had any dental training. The preference of each rater for each of the 43 profile photographs was scored on an attached visual analogue scale. The influence of the gender, education, and any previous dental training of the raters, when statistically evaluated, indicated that these parameters were not a factor in their ratings of the African American profiles. The 16 profile photographs which received the highest ratings were used in the present study as the "esthetically pleasing" group.

All pretreatment lateral cephalometric radiographs were digitized based on Arnett's STCA. STCA values were found for the "esthetically pleasing" African American sample and for the present study's entire African American sample. Results show that African American STCA values differ from Caucasian STCA values, African Americans tend to have more protrusive incisors, more protrusive lips, smaller nose projections, and greater menton thickness. The African American STCA values found in this study can be used as a guide when planning treatment for African American patients.

Introduction

Facial esthetics has been extensively studied over many years. The perception of beauty is innate and is formulated from an individual's cultural bias and preference. Facial features and their orthodontic implication have been under scrutiny from the inception of the profession. The contribution of soft tissue drape to esthetics is of great interest in current clinical orthodontics, however, variations in ethnic concepts of esthetically pleasing profiles have not been adequately addressed. Many have tried to determine the "normal" values that clinicians should aim to achieve, however, definitive normative values that can be applied to all patients do not exist. Since clinicians do not have patient specific orthodontic facial values for each individual who is treated, the orthodontist needs a scaffold of fundamental principles to help guide them in their treatment planning, which means treating toward "average" normative facial measurements for the specific ethnic group.

In the orthodontic community, there seems to be paradigm shifts occurring on the importance of esthetics in treatment planning. A leading orthodontist of the nineteenth century, Norman Kingsley, regarded esthetics as being important and a definite objective in treatment. In his philosophy, occlusion followed esthetics. Then as the twentieth century progressed, Angle[1] developed his philosophy where occlusion was the primary objective, and suggested non extraction orthodontic treatment as the optimal approach. Some orthodontists who followed Angle later disagreed with this concept, challenged his "nonextraction philosophy", and argued that it was impractical to adapt one standard to everyone.[2-5]

Current orthodontic philosophies encompass esthetics as a treatment objective.[2] Society today is more esthetically aware, in part due to the mass advertisements of

"cosmetic" procedures. Lay people are more versed in the ability of clinicians to address esthetic concerns and, in turn, seek treatment. The chief complaint from most patients presenting to orthodontic offices is most often an esthetic issue. In dentistry, the advent of composite restorations, Invisalign, and ceramic brackets has made correction of esthetics even more sought after.

The question to be answered is what does contemporary society consider to be beautiful? Society today is a melting pot of different ethnicities with a wide horizon of experiences and backgrounds. Is it possible to arrive at an acceptable concept of what is considered esthetically pleasing today? Literature has been published to test the subjectivity of what is considered esthetically desirable. As might be expected, since orthodontist have similar training, orthodontists tend to agree on what is esthetically pleasing.[6,7] Some studies[8-11] show that laypeople's viewpoint on esthetics is very similar to that of orthodontists. However, there are also studies[12] that indicate a discrepancy of opinion among different dental specialties. In addition there are studies indicating that there is a commonality on what is considered attractive across the world.[13,14]

Ethnic groups obviously possess a wide range of facial architecture. Studies[15,16] have been performed to try to identify exactly how and where facial architecture differs among races. Different ethnicities have also been examined to see whether there is a variation in esthetic preference among the races.[7,11,17,18,19,20]

For many years, orthodontist have been using cephalometrics to aide them in hard tissue diagnosis and treatment planning. After limitations were found for using only hard tissue measurements in orthodontic treatment planning, soft tissue lines and angles were developed.[21-24] Holdaway[25,26] noted that in order to adequately treat a patient, the

clinician must look beyond the hard tissues. Holdaway developed a soft tissue analysis to demonstrate the inadequacies of only utilizing a hard tissue analysis. His goal was to develop a treatment plan that would not adversely affect the patient's profile. Holdaway later expanded his soft tissue analysis to develop his visual treatment objective (VTO) to predict desired treatment results.

Later, Arnett and Bergman[27,28] presented nineteen facial keys as an adjunctive tool for treatment planning to prevent detrimental soft tissue results. They claim that by using their analysis, orthodontists can identify which tooth movements to avoid and thereby resulting in better predictability of facial outcome. Their analysis would also show the degree of the skeletal problem that exists. Should the skeletal problem prove to be too severe to be corrected by orthodontics alone, then surgery might be indicated. Arnett and Bergman's[27,28] two part facial analysis article also addressed the fact that there are, indeed, many different normative values present in different facial studies. They listed seven reasons for this inconsistency of normative values and are as follows; populations within the studies have different racial origins, studies were not unified in the type of occlusion present, lip posture was not consistent, natural head position was not always used as a reference, not all values were from cephalometric radiographs, exact measuring of the same trait is not always the same among studies, and some studies did not use only adult patients. These inconsistencies make it very important that each patient be evaluated by an analysis that is appropriate to that patient's age, lip posture, race, and head orientation. Orthodontists must bear in mind that these analyses are presented only as an aide in treatment planning.

Arnett et al[29] carried out a soft tissue evaluation of forty six Caucasian adults based on the philosophy of Arnett and Bergman's two part facial keys article.[42,43] Caucasian normative Soft Tissue Cephalometric Analysis (STCA) values and standard deviations were developed for dentoskeletal factors, soft tissue structures, vertical lengths, True Vertical Line projections, and facial harmony.

The purpose of the present study was to evaluate African American profiles from the perspective of African Americans in order to determine the African American STCA values based on Arnett's soft tissue cephalometric analysis. Once these African American values were determined, a comparison between the soft tissue normative values of African Americans and Caucasians was made.

Materials and Methods

The pretreatment orthodontic records of 87 adult African American patients (aged 18-35 years) who had been consecutively treated were obtained from a single private orthodontic practice. Of this sample of 87 patients, 43 (17 males and 26 females) met the following inclusion criteria for the present study: a Class I molar relationship, no obvious severe skeletal deformities, no syndromes, a pretreatment cephalometric radiograph and good facial photographs, specifically good profile photographs.

Profile photographs of the 43 selected patients for the present study were printed in color on separate pages and numbered 1-43. A visual analogue scale (VAS) from 0 to 10 was printed below each photograph, with 0 representing the least attractive rating and 10 being the most attractive rating. To record which profiles were the most esthetically pleasing from an African American perspective, African American individuals (from now on referred to as raters) who were in the waiting rooms of the dental school were asked to

use the VAS and rate the profile photographs. A total of 40 raters agreed to evaluate the photographs. The photographs numbered 1-4 were used to allow the raters to become accustomed to rating the photographs using the VAS, so only photographs numbered 5-43 were used to ascertain the most esthetically pleasing profiles. The ratings were recorded and placed in quartiles from highest average rating to lowest average rating. The most esthetically pleasing profile photographs were selected as the photographs that were in the top two quartiles.

The 40 raters also completed a form indicating their age, gender, highest education level, occupation, and whether or not they had any dental training. Statistics were carried out to determine if age, gender, education level and dental training affected the way the profile photographs were rated.

The 39 pretreatment cephalometric radiographs of the orthodontic patients were digitally traced by the same investigator utilizing a computer program for imaging and cephalometric analysis (Dolphin Imaging, version 10.5, Dolphin Imaging Systems, LLC, Chatsworth, CA). Arnett's soft tissue cephalometric analysis was performed on each radiograph. The measurements used in each tracing are listed in Table 1. Average values were computed for the entire sample of 39 and also for the esthetically pleasing group. These values were then compared to the Caucasian normative values developed by Arnett. It should be noted that Arnett's selection of optimal Caucasian profiles had been selected by Arnett only. In the present study, 40 African American raters selected the optimal African American profiles.

Table 1. Cephalometric Measurements: Mx1=maxillary central incisor, Sn=subnasale, Md1=mandibular central incisor, Me'=soft tissue menton, ULI=upper lip inferior, LLS=lower lip superior, Na'=soft tissue nasion, ULA=upper lip anterior, LLinside=lower lip inside, LLoutside=lower lip outside, Pog=pogonion, Pog'=soft tissue pogonion, Me=Menton, Me'=soft tissue menton, Gb'=soft tissue Glabella, NT=nasal tip, A'=soft tissue A point, TVL=true vertical line, Col=columnella, LLA=lower lip anterior, B'=soft tissue B point, NTP=neck throat point

1. Dentoskeletal Factors
    a. Maxilla
        i. Upper incisor projection (Mx1-Sn) (mm)
    b. Mandible
        i. Lower incisor projection (Md1-Sn)(mm)
        ii. Skeletal (Md1-Me'/Mx1-Sn) (%)
    c. Vertical
        i. Mx anterior height (Sn'-Mx1)(mm)
        ii. Chin height (Md1-Me')(mm)
2. Facial Heights (all measured parallel to TVL)
    a. Soft tissue heights
        i. Upper lip length (SN'-ULI)(mm)
        ii. Interlabial gap (ULI-LLS)(mm)
        iii. Lower lip length (LLS-Me')(mm)
        iv. Soft tissue (LLS-Me'/Sn/-ULI)(%)
        v. Lower 1/3 of face (Sn'-Me')(mm)
        vi. Facial height (Na'-Me')(mm)
    b. Hard tissue heights
        i. Mx1 exposure (ULI-Mx1)(mm)
        ii. Mx anterior height (Sn'-Mx1)(mm)
        iii. Chin height (Md1-Me')(mm)

3. Soft Tissue Thickness
        i. Upper lip thickness (Mx1 labial-ULA)(mm)
        ii. Lower lip thickness (LLinside-LLoutside)(mm)
        iii. Soft tissue chin thickness (Pog-Pog')(mm)
        iv. Menton thickness (Me-Me')(mm)
4. Projections (all to horizontal distances TVL)
    a. High midface projection
        i. Subnasale to soft glabella (Sn to Gb')(mm)
    b. Maxillary projection
        i. Nasal projection (NT)(mm)
        ii. Soft tissue A point' (A')(mm)
        iii. Upper lip anterior (ULA-Sn)(mm)
        iv. Upper incisor projection (Mx1-Sn)(mm)
        v. Upper lip angle (ULA-Sn'-TVL)(degrees)
        vi. Nasolabial angle (Col-Sn'-ULA)(degrees)
    c. Mandibular projection
        i. Lower incisor projection (Md1-Sn)(mm)
        ii. Lower lip anterior (LLA)(mm)
        iii. Soft tissue B point (B')(mm)
        iv. Soft tissue pogonion (Pog'-Sn)
        v. Throat length (NTP-Pog')(mm)
5. Facial Harmony
    a. Full facial balance
        i. Facial angle (G'-Sn'-Pog')(degrees)
        ii. Forehead to Mx (G'-A')(mm)
        iii. Forehead to chin (G'-Pog')(mm)
    b. Interjaw
        i. Subnasale to chin (Sn'-Pog')(mm)
        ii. Mx to Md (A'-B')(mm)
        iii. Lip to lip (ULA-LLA)(mm)
    c. Intramandibular
        i. Md1 to chin (Md1-Pog')(mm)
        ii. LLA to chin (LLA-Pog')(mm)
        iii. B' to chin (B'-Pog')(mm)

Results

In an attempt to arrive at "esthetically pleasing" normative values of profiles for African Americans from an African American perspective, the present study asked African Americans in the waiting rooms of the dental school to rate 43 different African American profiles until a total of forty who were asked to review the profiles agreed to participate as raters. There were 31 females (77.5%) and 9 males (22.5%) who agreed to participate as raters. These forty raters completed a questionnaire that included their age (range 18-59 years), gender (Table II), highest education level (Table III), and whether or not they had any education in the dental field (Table IV)

Table II. Gender of Raters

Gender	Number	Percent
Female	31	77.5
Male	9	22.5

Table III. Education of Raters

Highest level of Education	Number	Percent
High school	3	7.5
College	27	67.5
Post grad	10	25

Table IV. Dental Experience of Raters

Dental Experience	Number	Percent
No	31	77.5
Yes	9	22.5

The raters then were asked to judge 43 different African American profile photographs that were printed in color on separate sheets of paper. Under each profile photograph, there was a visual analogue scale (VAS) ranging from 0 to 10. The visual analogue scale

was explained as 0 being least attractive and 10 being the most attractive. The participants were asked to review all 43 profile photographs before deciding how attractive they considered each profile to be. After looking at every profile photograph, raters were asked to mark the VAS along the line according to their preference of how "esthetically pleasing" they considered each profile to be. No statistical difference among raters was found between genders (Table V), educational level (Table VI), or dental experience (Table VII).

Table V. Type 3 Statistical Tests of Fixed Effects for Gender

Effect	Num DF	Den DF	F Value	Pr>F
Gender	1	38	0.01	0.9381

Table VI. Type 3 Statistical Tests of Fixed Effects for Educational Level

Effect	Num DF	Den DF	F Value	Pr>F
Education Level	2	37	0.36	0.6997

Table VII. Type 3 Statistical Tests of Fixed Effects for Dental Experience

Effect	Num DF	Den DF	F Value	Pr>F
Dental experience	1	38	0.18	0.6766

After each profile picture had been scored by the forty raters, averages for each profile picture were determined. (Figure I) The averages were then placed in quartiles. The first four profile photographs (photographs 1-4) were not included in the quartiles because they were used to accustom the rater to the VAS. Therefore, 39 total profile images were included in the final quartiles. (Table VIII) The highest two quartiles were assigned as the most "esthetically pleasing" group.

Figure I. Average Scores for Profile Photographs.

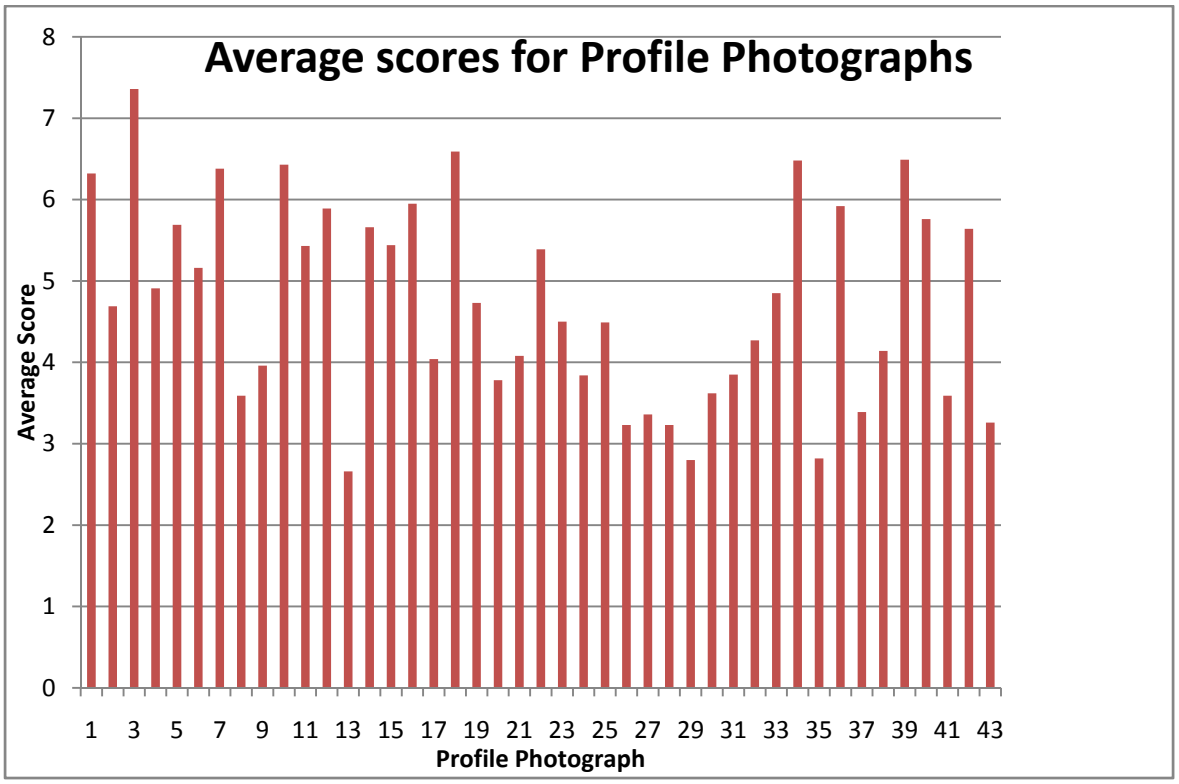

Table VIII. Assigned Quartiles for Profile Photographs Ratings

Quantile	Estimate
100% Max	7.81395
99%	7.81395
95%	7.06977
90%	6.59884
75% Q3	5.3343
50% Median Q2	4.5843
25% Q1	3.97093
10%	3.59012
5%	2.93605

Arnett's Soft Tissue Cephalometric Analysis (STCA) was carried out on the cephalometric radiographs of all 39 subjects whose profile photographs had been used in the present study. STCA averages were calculated for the entire sample (Table IX) and

for the separate “esthetically pleasing” group made up from the highest two quartiles (Table IX). Arnett’s Caucasian STCA is shown in the last two columns of Table IX.

Statistical analysis

Mean, minimum, maximum and standard deviation were calculated as descriptive statistics for VAS scores and cephalometric measurements, and frequencies and percentages were calculated for categorical measures. Mixed model analysis of variance was used to evaluate reliability among the raters and to compare mean ratings among raters, gender of raters and gender of person in photograph. The intraclass correlation coefficient was calculated as a measure of reliability among the raters.

Table IX. STCA Values and Standard Deviations

1. Dentoskeletal factors (determine profile)	esthetically pleasing values (2 highest quartiles)	SD	African American Values (total sample)	SD	Caucasian Values	SD
a. maxilla						
upper incisor projection (Mx1-Sn) (mm)	-5.64	2.62	-3.44	4	-12.1	1.8
b. mandible						
lower incisor projection (Md1-Sn) (mm)	-8.66	2.93	-6.29	4.43	-15.4	1.9
Skeletal (Md1-Me'/Mx1-Sn) (%)	189.53	16.74	186.73	19.55	197	8.9
c. vertical						
Mx anterior height (Sn'-Mx1) (mm)	27.91	3.99	28.37	3.26	28.4	3.2
chin height (Md1-Me') (mm)	52.47	5.49	52.59	5.12	56	3
2. Facial Heights (all measured parallel to TVL)						
a. soft tissue heights						
upper lip length (Sn'-ULI) (mm)	26.21	4.42	26.13	3.27	24.4	2.5
Interlabial gap (ULI-LLS) (mm)	2.42	1.94	3.01	2.41	2.4	1.1
lower lip length (LLS-Me') (mm)	50.27	6.21	50.41	5.46	54.3	2.4
Soft tissue (LLS-Me'/Sn'-ULI) (%)	194.77	25.92	194.49	20.8	223	15.6
lower 1/3 of face (Sn'-Me') (mm)	78.89	9.43	79.55	7.64	81.1	4.7
facial height (Na'-Me') (mm)	129.66	12.18	129.67	10.29	138	6.5
b. hard tissue heights						
Mx1 exposure (ULI-Mx1) (mm)	1.7	1.8	2.25	2.07	3.9	1.2
Mx anterior height (Sn'-Mx1) (mm)	27.91	3.99	28.37	3.26	28.4	3.2

chin height (Md1-Me') (mm)	52.47	5.49	52.59	5.12	56	3
3. Soft Tissue Thickness						
upper lip thickness (Mx1 labial-ULA) (mm)	15.51	3.31	16.01	2.88	14.8	1.4
lower lip thickness (LLinside-LLoutside) (mm)	14.72	2.24	15.13	2	15.1	1.2
soft tissue chin thickness (Pog-Pog') (mm)	14.35	3.1	14.54	3.36	13.5	2.3
menton thickness (Me-Me') (mm)	10.64	2.89	11.76	3.16	8.8	1.3
4. Projections (all to horizontal distances TVL except *)						
a. high midface projection						
subnasale to soft glabella (Sn to Gb') (mm)	-9.86	4.85	-9.86	4.25	-8	2.5
b. maxillary projection						
Nasal projection (NT) (mm)	13.57	1.96	13.7	1.78	17	1.7
soft tissue A Point' (A') (mm)	3.09	1.79	3.82	2.32	0.7	1.5
upper lip anterior (ULA-Sn) (mm)	7.76	2.95	9.1	3.15	3.3	1.7
upper incisor projection (Mx1-Sn) (mm)	-5.64	2.62	-3.44	4	-12.1	1.8
upper lip angle (ULA-Sn'-TVL) (º)	17.36	8.42	21.29	8.62	8.3	5.4
Nasolabial angle (Col-Sn'-ULA) (º)	93.63	9	89.72	10.19	106	7.7
c. mandibular projection						
lower incisor projection (Md1-Sn) (mm)	-8.66	2.93	-6.29	4.43	-15.4	1.9
lower lip anterior (LLA) (mm)	5.44	4.36	6.85	4.8	1	2.2
soft tissue B point (B') (mm)	-5.19	4.12	-3.82	5.35	-7.1	1.6
soft tissue Pogonion (Pog'-Sn) (mm)	-4.58	4.45	-4.06	5.84	-3.5	1.8
Throat length (NTJ-Pog') (mm)	40.11	10.2	38.51	12.17	61.4	7.4
5. Facial Harmony (sensitive)						
a. Full facial balance						
Facial angle (G'-Sn'-Pog') (º)	167.91	4.99	168.13	4.89	169	3.2
Forehead to Mx (G'-A') (mm)	12.94	5.63	13.67	5.46	7.8	2.8
Forehead to chin (G'-Pog') (mm)	5.3	7.13	5.8	8.45	4.6	2.2
c. Interjaw						
Subnasale to chin (Sn'-Pog') (mm)	4.52	4.54	4.11	5.98	4	1.7
Mx to Md (A'-B') (mm)	8.28	3.48	7.64	4.56	6.8	1.5
lip to lip (ULA-LLA) (mm)	2.31	2.6	2.24	3.17	2.3	1.2
d. intramandibular						
Md1 to chin (Md1-Pog') (mm)	4.09	4.75	2.22	5.63	11.9	2.8
LLA to chin (LLA-Pog') (mm)	9.99	2.93	10.91	4.02	4.4	2.5
B' to chin (B'-Pog') (mm)	0.63	1.85	-0.24	3.14	3.6	1.3

Discussion

The aim of the present study was to develop African American soft tissue profile values. These values were based on Arnett's soft tissue cephalometric analysis (STCA)

that was performed on a Caucasian sample. In the development of Arnett's STCA values, one investigator chose "esthetically pleasing" Caucasian individuals to develop the STCA average numbers. To try and develop an "esthetically pleasing" African American sample, the investigators of the present study decided to derive the sample from an unbiased African American perspective. To obtain an unbiased group of African American raters, African Americans who were in the waiting rooms of the dental school were asked to participate by using a visual analogue scale to rate a group of 43 African American profile photographs. Forty African Americans from this group agreed to participate as raters.

Data consisting of age, gender, education level and whether or not the raters had any dental experience was recorded from the raters and statistics were carried out to see if any of those parameters affected the way the raters rated each profile photograph.

Several studies have found that lay people and people who have dental experience have similar preferences in facial esthetics.[8,9,10,13,14] However, there are some studies[12,30] that found that individuals who had dental training had a different facial preference than did laypeople. The present study found that there was no statistical difference in raters based on their dental experience or education level.

A study by De Smit and Dermaut[10] found that the sex of the rater did not have any significant influence on what they rated esthetically pleasing. The present study is in agreement with De Smit and Dermaut in that there was no statistical difference between the gender of the raters (p 0.9314).

An interclass correlation was carried out to measure the inter rater reliability. The interclass correlation was 0.375. Mean ratings were statistically different among the

raters with a p value < 0.0001. Both of these results are to be expected because what people perceive as "esthetically pleasing" is subjective and will vary among individuals.

The initial goal was to select the "esthetically pleasing" group from the highest rated photographs. It is important to note that the present study's "esthetically pleasing" group was chosen by 40 randomly selected African Americans whereas Arnett's "esthetically pleasing" group was chosen by one investigator. The investigators of the present study found that it would be misleading to statistically compare the "esthetically pleasing" group in the present study to Arnett's "esthetically pleasing" group because the groups were chosen differently. For this reason, the investigators decided it would be of interest to find the present study's "esthetically pleasing" STCA values as well as the present study's entire sample STCA values. It was decided to list the present study's STCA values for both the "esthetically pleasing" group and the entire sample next to Arnett's Caucasian STCA values for a general comparison.

When comparing both groups of the present study, it was surprising to find both of the groups had very similar STCA values. This finding indicates that it is probably more accurate to find STCA values for different ethnic groups as whole samples instead of trying to find each ethnic group's "esthetically pleasing" group. If a large enough sample of individuals in a certain ethnic group is collected and an average is found for that group, any outliers in individual esthetics would be accounted for.

When comparing the STCA values of the present study's two groups and Arnett's Caucasian group, several differences are noted. Of the dentoskeletal factors, both groups in the present study had the upper incisor projection (Mx1-Sn) and the lower incisor projection (Md1-Sn) that were substantially different than the Caucasian sample. The

"esthetically pleasing" African American group has an upper incisor projection of value of -5.64 and the total African American sample group has a value of -3.44, whereas the Caucasian value is -12.1. The lower incisor projection value for the Caucasian sample is -15.4, whereas the "esthetically pleasing" African American group value is -8.66 and the value for the total African American sample group is -6.29. These values show that both African American groups have more protrusive incisors compared to the Caucasian sample.

Of the facial height measurements, upper incisor exposure (ULI-Mx1) and menton thickness (Me-Me') differed among the African American values and the Caucasian values. Both of the African American values for upper incisor exposure in the present study are lower than the Caucasian sample. Comparing the values would indicate that African Americans prefer less upper incisor show than would Caucasians. However, the previous statement may not be entirely appropriate because the raters for these photographs in the present study did not rate a frontal smile picture. Anatomically African Americans could have less upper incisor show at rest than Caucasians, but on animated smile could show the same amount of upper incisor show as Caucasians due to more flaccid lips. Menton thickness was also found to be thicker in both African American samples than in the Caucasian sample.

Projection measurements had the most discrepancy between both the African American samples in the present study and Arnett's Caucasian sample. The African American value for nasal projection is less than that for the Caucasian sample indicating that African Americans have smaller nose projections. Soft tissue A point for the African American samples in the present study is further forward of the True Vertical Line

(TVL) compared to Arnett's Caucasian sample. Upper lip anterior and lower lip anterior measurements were more anterior in the African American sample compared to the Caucasian sample which indicates that African Americans have more protrusive lips. This finding is in agreement with that reported in a study by Suschner[15] who found African Americans have more protrusive lips than Caucasians. The African American values for upper and lower incisor projections are both closer to the TVL than the Caucasian values which demonstrates that African Americans have more protrusive incisors. The upper lip angle for the African American samples was larger than the Caucasian angle which confirms that African Americans have more procumbent upper lips.

Of the facial harmony values, two of the three intra-mandibular values differed among the African American samples and the Caucasian sample. Md1 to chin (Md1-Pog') was smaller in the African American groups than the Caucasian group. This confirms that African Americans have a more protrusive lower incisor. LLA to chin (LLA-Pog') was larger for the African American samples than for the Caucasian sample which also confirms that African Americans have more procumbent lower lips.

As would be expected, several values were found to differ among Caucasians and African Americans. These values are not to be used as strict guidelines, but as a more ethnically correct reference for treatment planning African American patients.

Conclusions

- The African American Soft Tissue Cephalometric Analysis (STCA) values are different from the Caucasian STCA.

- The African American STCA values found in this study can be used as an aide and/or guide when planning treatment for African American patients.
- The results suggest it is probably more accurate to find STCA values for different ethnic groups as an entire sample instead of trying to find an “esthetically pleasing” sample for each group.
- The influence of the gender,education and any previous dental training of the raters, when statistically evaluated, indicated that these parameters were not a factor in their ratings of the African American profiles.

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CONCLUSIONS

The purpose of this study was to quantify African American soft tissue normative values based on Arnett's soft tissue cephalometric analysis (STCA). To obtain an African American sample of "esthetically pleasing" individuals, a survey was conducted using profile photographs of 43 African American orthodontic patients whose pretreatment orthodontic records met the inclusion criteria. Pretreatment cephalometric radiographs were traced and STCA values were found for the "esthetically pleasing" African American sample as well as for the present study's entire African American sample. The following conclusions were drawn:

- The African American Soft Tissue Cephalometric Analysis (STCA) values are different from Caucasian STCA.
- The African American STCA values found in this study can be used as an aide or guide when planning treatment for African American patients.
- It is probably more accurate to find STCA values for different ethnic groups as an entire sample instead of trying to find an "esthetically pleasing" sample for each ethnic group.
- The influence of the gender, education and any previous dental training of the raters, when statistically evaluated, indicated that these parameters were not a factor in their ratings of the African American profiles.

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APPENDIX A

INSTITUTIONAL REVIEW BOARD FOR HUMAN USE APPROVAL FORM

THE UNIVERSITY OF ALABAMA AT BIRMINGHAM

Institutional Review Board for Human Use

Form 4: IRB Approval Form
Identification and Certification of Research
Projects Involving Human Subjects

UAB's Institutional Review Boards for Human Use (IRBs) have an approved Federalwide Assurance with the Office for Human Research Protections (OHRP). The UAB IRBs are also in compliance with 21 CFR Parts 50 and 56 and ICH GCP Guidelines. The Assurance became effective on November 24, 2003 and expires on February 14, 2009. The Assurance number is FWA00005960.

Principal Investigator: WILBORN, LISA J

Co-Investigator(s):

Protocol Number: **X061215008**

Protocol Title: *African American Soft Tissue Profile Analysis*

The IRB reviewed and approved the above named project on 07/25/07. The review was conducted in accordance with UAB's Assurance of Compliance approved by the Department of Health and Human Services. This Project will be subject to Annual continuing review as provided in that Assurance.

This project received EXPEDITED review.

IRB Approval Date: 7-25-07

Date IRB Approval Issued: 07/25/07

HIPAA Waiver Approved?: Yes

Marilyn Doss

Marilyn Doss, M.A.
Vice Chair of the Institutional Review
Board for Human Use (IRB)

Investigators please note:

The IRB approved consent form used in the study must contain the IRB approval date and expiration date.

IRB approval is given for one year unless otherwise noted. For projects subject to annual review research activities may not continue past the one year anniversary of the IRB approval date.

Any modifications in the study methodology, protocol and/or consent form must be submitted for review and approval to the IRB prior to implementation.

Adverse Events and/or unanticipated risks to subjects or others at UAB or other participating institutions must be reported promptly to the IRB.

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Principal Investigator:	WILBORN, LISA J
Co-Investigator(s):	
Protocol Number:	**X061215008**
Protocol Title:	*African American Soft Tissue Profile Analysis*

The IRB reviewed and approved the above named project on 7-01-08. The review was conducted in accordance with UAB's Assurance of Compliance approved by the Department of Health and Human Services. This Project will be subject to Annual continuing review as provided in that Assurance.

This project received EXPEDITED review.

IRB Approval Date: 7-01-08

Date IRB Approval Issued: 7-01-08

HIPAA Waiver Approved?: Yes

Marilyn Doss

Marilyn Doss, M.A.
Vice Chair of the Institutional Review Board for Human Use (IRB)

Investigators please note:

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