Assessing the Influence of Chin-Throat Length on Perceived Profile Attractiveness

MAJ Raquel Brentson, DDS, MS, Tri-Service Orthodontic Residency Program, Air Force Post Graduate Dental School, 59th MDW, JBSA-Lackland Air Force Base, Texas, USA and Uniformed Services University of the Health Sciences Postgraduate Dental College

LtCol Erin M. Speier, DMD, Tri-Service Orthodontic Residency Program, Air Force Post Graduate Dental School, 59th MDW, JBSA-Lackland Air Force Base, Texas, USA

Abstract

Introduction: The submental-cervical angle is often considered an important esthetic parameter when evaluating lower profile morphology, while the chin-throat (C-T) length has not traditionally been considered. The purpose of this study was to evaluate the perception of facial attractiveness ratings of convex profiles with different C-T lengths. **Methods**: This investigation was a questionnaire-based study to present a series of digitally manipulated images. Profile photos of a Caucasian male and female subject were altered to similar skeletal class II facial convexity and the C-T measurement from soft tissue menton to throat point was adjusted in 5mm increments from 8mm – 43mm. Survey participants included orthodontic clinicians, orthodontic patients and lay people that rated the images on 100mm visual analogue scales (VASs). **Results:** There was an overall direct linear relationship with the mean attractiveness rankings and C-T lengths. Participants in all groups (total n=261) gave significantly higher rankings for the longer C-T lengths (33-43mm) compared to the shorter C-T length profiles (8-23mm), and rankings were significantly different ($p < 0.001$) for the various C-T lengths presented. In regards to surgical intervention, all three observer groups expressed a significantly increased desire to elect surgical correction of both the female and male profiles with the shortest C-T lengths (8-13mm). **Conclusions:** Longer C-T lengths (33-43mm) rendered the skeletal class II profiles as more esthetically acceptable for both the female and male subject presented. The chin-throat length

does alter as a result of mandibular orthognathic surgery and should be considered more routinely in diagnoses and treatment planning in addition to other standard facial angles. A surgical treatment plan should be considered for patients with C-T lengths ≤ 13mm.

Keywords: Profile, Attractiveness, Orthodontics, Orthognathic surgery, Facial esthetics, Throat-length, Chin-throat length

Introduction:

The perception of a human face can elicit a wide array of emotional, physical and social inferences.[1] Likewise, the determination of facial attractiveness also affects a diverse range of critical social implications ranging from friendships and mate selection, to an individual's occupational successes, confidence, judgements on intelligence, and may even influence election results. [1-3] Despite the complexities of facial attractiveness, extensive studies have shown that there is not only a range of acceptability in various facial forms and traits, there is also considerable agreement across diverse cultures on what is deemed attractive.[1] This is likely due to the fact that a fundamental attribute of an esthetically pleasing face, is one in which the various facial features are well proportioned, balanced and relate well to other facial features, whether viewed from the front or the side.[4]

Orthodontists plan treatment that can alter a patient's facial appearance, whether through orthodontics alone or a combination of orthodontics, growth modification, and orthognathic surgery. As such, orthodontic training focuses on clinical abilities to not only identify dentofacial deformities, but also on a thorough understanding of facial esthetics.[5] Despite the aid of numerous diagnostic cephalometric analyses and facial measurements developed over the years, the point at which normal becomes abnormal cannot always be easily defined and is often determined by the clinician's sense of balance and the patient's perception of imbalance.[6] However, patients' perceptions of their own conditions can vary greatly and a rather mild discrepancy can be perceived by the individual as severe enough that the psychosocial aspect can be a significant motivator to seek treatment. With that said, patients may be unwilling to admit their exact motives for treatment during a patient interview.[7,8]

Several investigations have aimed to bridge the gap between clinician and patient perceptions, by evaluating select facial angles or measurements and how they influence overall profile attractiveness, among orthodontic clinicians, their patients, and the public. Some of the facial parameters evaluated in these studies include: lip position, submental-cervical angle, mentolabial angle, nasofacial angle, varying degrees of facial convexity, chin prominence, chin height, lower face height and mandibular prominence.[9-16] However, no studies were found that addressed how changes in the chin-throat length could influence the esthetic perception of the facial profile. While the submental-cervical angle is often considered during diagnosis as a key parameter of lower face esthetics, the chin-throat length (C-T length), as viewed in the profile, can also greatly impact the overall appearance of an individual, as it may influence the perception of chin prominence.

The purpose of this study, was to qualitatively evaluate the effect that modified chin-throat lengths have on the perception of facial attractiveness when assessing convex profiles among orthodontists, orthodontic patients and laypersons. Additionally, this study aimed to investigate the perception on the need or desire for corrective surgical procedures among these groups for each profile presented. The null hypotheses to be investigated are: 1). There is no difference in the perception of facial attractiveness ratings with different chin-throat lengths. 2). There is no difference in the perception of facial attractiveness ratings among the three groups of orthodontic clinicians, orthodontic patients and laypersons. 3). There is no difference in the perceived need for surgical correction among the three groups of survey participants when rating the various profiles presented.

Materials and Methods:

This investigation was an anonymous, one-time, questionnaire-based study utilizing a digital survey platform (Survey Monkey, San Mateo, CA) to evaluate the effect of incremental changes in the chin-throat length on the perceived attractiveness of convex facial profiles consistent with skeletal class II mandibular deficiency. The target audience for participation in this study was to compare responses by orthodontic clinicians, orthodontic patients, and laypersons who were asked to rate the altered profile photos.

Ethical approval

This study was approved by the Institutional Review Board of the 59th Medical Group Wing, Air Force Post Graduate Dental School, JBSA-Lackland Air Force Base, Texas. In accordance with Revised Common Rule, Section 219.116, a waiver of documentation for informed consent was obtained. All survey participants agreed to an informational informed consent presented at the start of the survey which indicated that proceeding to the next page for the study to commence, thereby gave implied consent. The male and female subjects whose photos were altered in the study signed photo release documentation and agreed to research participation.

Image Creation

The images chosen for use in this study were selected from the existing patient population with records in the Dolphin Imaging 11.95 database (Patterson Dental, Saint Paul, MN), from the Air Force Post Graduate Dental School, Lackland Air Force Base, San Antonio, Texas. The selection criteria included both a male and female patient of similar race/ethnicity, and similar age with existing right lateral profile photos and lateral cephalometric tracings on file. Patients that seemed too young in appearance that could be perceived as still undergoing jaw

growth and development were excluded. Once subjects were chosen, updated profile photos were taken for the purpose of this study to ensure limited distractors such as eccentric hair-styles, facial hair or make-up, and to achieve optimal lighting.

To further standardize the evaluation, both patient images were then altered in the lower third to portray similar class II skeletal convexities according to Down's facial angle of convexity (G'-Sn-Pog' = 20°, Normative value = 12°, Standard Deviation = 2°) using the virtual surgical prediction (VSP) function on Dolphin Imaging software. Since the only variable being assessed was the influence of the C-T lengths on convex profiles, any adverse effects on the lips that resulted from the class II manipulation was corrected, to isolate the testing of only the one variable. Further, while the male subject had a pronounced throat point, to ensure consistency in measurements, a more defined throat point was created on the female subject. These photos were then considered the baseline patient photos from which chin-throat length manipulation was completed for the study parameters. Adobe Photoshop Elements 2021 Photo Editor (San Jose, CA) was used to ensure consistency in all images presented after all alterations made.

A total of 16 different color photographs were included in the survey. Each male and female photo had the chin-throat length adjusted in 5 mm increments to generate a total of eight altered photos ranging from 8mm – 43mm (Fig.1). To ensure the measured increments and overall chin-throat lengths were consistent, the patients profile photos were superimposed on their lateral cephalometric radiograph which contained a 100mm ruler (Fig. 2). Chin-throat length adjustments were done in PowerPoint (Microsoft PowerPoint version 16.45, Redmond, WA) using an overlay section of the neck containing throat point which was cut and pasted over the calibrated profile photo and incrementally moved backwards to lengthen or forward to shorten. Vertical gridlines were added to measure C-T lengths with the 100mm ruler used for

conversion. This also adjusted for resizing and magnification errors. This process ensured that digital measurements represented clinically applicable C-T lengths. The submental-cervical angle was also measured to ensure it remained consistent across all images for the male and female, respectively.

Survey Design

The composite of eight photos for each patient was displayed initially together and survey participants were asked to choose the most attractive profile image out of the eight presented (Fig.1). Supplementary questions then displayed one image at a time, with no labels, in random order, and observers were asked to rate the profile on a 100mm visual analogue scale (VAS). The following descriptive terms were used as anchor points for the ends and middle of the sliding VAS, as follows: left, 0mm: 'Less attractive'; middle, 50mm: 'Normal/Average'; and right, 100mm: 'More attractive.' An additional question was also asked with each image, if participants would consider having corrective jaw-surgery to improve the facial appearance, if it was their face (Fig.3).

Results:

The scores of 261 participants were evaluated using the SPSS package for statistical analysis (version 24.0; IBM, Armonk, NY). Note that "orthodontist" or "orthodontic clinician" respondents (n=98) evaluated in this study included participants under the following sub-categories: Orthodontist (n=66), Orthodontic Resident (n=26), Oral Surgeon (n=4) and Oral Surgery Resident (n=2). At the end of data collection, there were a total of n=300 respondents, with 137 in the orthodontist group. However, all surveys completed by participants that indicated they were either a general dentist or other dental specialist in a subsequent question were omitted from evaluation. The investigators do not equate a lesser knowledge level of other

dental colleagues to that of the average layperson, however, for purposes of this particular study, the investigators identified the groups being surveyed specifically to evaluate if a heightened awareness or advanced knowledge of facial esthetics would affect results. The various demographics by group that were collected are reported in Table I.

Descriptive statistics including the mean and standard deviation were used to assess the outcome measure, which was the facial attractiveness ratings of different chin-throat lengths for the female and male photos. To test our first null hypothesis, a one-way repeated measures analysis was completed and showed that there was a significant difference ($p<0.001$) for both the female and male profile attractiveness ratings at different chin-throat lengths, therefore rejecting the null hypothesis. However, for the female profile images presented, there was no significant difference between C-T lengths 18mm and 23mm (F3 – F4), and for the longer C-T lengths, there was no significant difference in the ratings of the 33mm – 43mm profiles (F6 – F8). Likewise, for the male profile images rated, the longer C-T lengths 33mm – 43mm (M6 – M8), had no significant difference in attractiveness ratings among them, but were rated significantly different than the rest of the C-T length profiles presented.

A two-way ANOVA looking at chin-throat lengths and the different groups of raters was performed to test our second null hypothesis and determined that for the female profiles presented, there was a significant interaction ($p<0.022$) between chin-throat length and rater group, making interpretation of the main effects impossible, in that there was no definitively predictable pattern in how they differed. Tukey post-hoc analysis showed that the orthodontist group was significantly different from the other two groups of raters for only specific chin-throat lengths. Bonferoni correction was applied to adjust for multiple comparisons, and therefore the p-value for significance was reduced to $p<0.006$. A significant difference between the

orthodontists' attractiveness ratings compared to the layperson and patient groups for the female profiles with 28mm and 33mm C-T lengths ($p<0.001$), thus rejecting the null hypothesis. When evaluating the descriptive statistics (Fig. 5a & 5b), the layperson and orthodontic patient groups were much more critical in their ratings of the female profiles (F3 – F7) with C-T lengths from 18mm-38mm and were nearly the same across all three groups for the longest (F8 = 43mm) and shortest (F1 – F2) 8mm – 13mm C-T lengths. In regards to the male profiles presented, statistically speaking, there was not a significant difference in the interaction term and the ratings of the three groups followed a predictable pattern for the chin-throat lengths presented, failing to reject the null hypothesis for male profiles. Clinically, however, this may be interpreted that all groups comparably discerned how the C-T length influenced the perceived attractiveness, and that advanced training in facial esthetics was inconsequential, perhaps because the changes in chin-throat length had such an obvious impact on the male profile appearance (Figures 6a & 6b).

Chi-square tests were performed to assess the third null hypothesis that there was no difference in the perceived need for surgical correction among the three groups of survey participants when rating the various profiles. Statistical analysis revealed significant differences in the responses among the groups surveyed for both female and male profiles at random C-T lengths, thus rejecting the null hypothesis. However, of even more clinical significance, data showed that for both the female and male profiles with the shortest C-T lengths ≤ 13mm, more than 50% of survey participants in all groups responded that they would consider jaw surgery to improve the profile, if it were theirs, with percentage of "Yes" responses ranging from 50.0 – 90.8% for male profiles F1 – F2, and 53.5% - 71.4% for female profiles F1 – F2.

In regards to the most attractive female and male profile, when participants were presented a composite of the eight images for side-by-side comparison (Fig.1), the participants

ranked the 38mm C-T length profiles (F7, M7) the highest, and the 43mm (F8, M8) profiles second highest (Fig. 7)

Discussion:

The orthodontic diagnosis and treatment planning of patients should always focus on a comprehensive assessment of not only the dental and facial esthetics, but occlusal and TMJ functions as well as potential sleep-related breathing disorders. Obstructive sleep apnea can have severe co-morbidities and orthognathic surgery can potentially improve or adversely affect the nasopharynx and hypopharynx airway spaces.[17-19] Positional changes of the hyoid bone, tongue and suprahyoid musculature that results with orthognathic surgery of the mandible not only affects the airway, but the submental soft tissue components and will consequently impact overall esthetics.[18-20] The facial lower-third including the submental-cervical area, is a major determinant of profile attractiveness, and thus a critical area of the orthodontic evaluation.[15] According to Kiyak, the majority (41 – 89%) of Class II patients present with an aesthetic chief complaint when seeking orthognathic surgery, making proper esthetic evaluation of primary importance.[21] However, many patients seek orthodontic treatment with solely dental-focused chief complaints, and are often unaware of the correlation between their dental-skeletal discrepancy to an unaesthetic profile and consequently may not include this in a chief complaint, even when probed about esthetic concerns. Another subset of orthodontic patients, may be completely unaware any profile imbalance exists. Including proper treatment recommendations for profile augmentation may be more difficult for clinicians in these instances.

Countless studies on attractiveness have revealed the complexities that come with defining beauty, and that what is considered attractive to patients and the average layperson may not concur with what orthodontists and surgeons perceive as attractive based on their experience

and advanced training.[15,21] The purpose of this study, was to qualitatively evaluate if different chin-throat lengths influenced the perception of facial attractiveness when assessing convex profiles and to compare if these perceptions differed among orthodontic clinicians, orthodontic patients and laypersons. Additionally, this study aimed to investigate the perceived need or desire for corrective surgical procedures, among the groups surveyed, based on the profiles presented.

The null hypotheses being investigated were that there was no difference in the perception of facial attractiveness ratings with different chin-throat lengths at all, or among the three observer groups. Secondarily, the authors assessed how all three observer groups compared in their desire to elect surgical correction for each altered throat-length profile. With regard to outcomes, the first null hypothesis was rejected. The changes in throat lengths had a direct relationship with overall attractiveness ratings, in that, shorter C-T lengths garnered much lower ratings, and as throat length increased, attractiveness ratings also increased. This was true among all three groups of the targeted survey participants. In regards to how the ratings compared across the groups, the layperson and orthodontic patient groups were more highly critical, particularly of the female profiles presented as compared to the orthodontist group attractiveness ratings. This observation may indicate the general public prefers a less convex profile (or more chin prominence) on a female than has traditionally been thought. Indeed, a recent article in Vogue magazine, titled "How the Defined Jaw Replaced High Cheekbones As Beauty's Most-Wanted," references a 2017 study by the American Society for Dermatologic Surgery, and describes the rising trend in both men and women seeking aesthetic procedures to help improve jawline definition and eliminate excess submental fat.[22]

Whereas several studies have shown that the perception of facial attractiveness differs between patients, peers, and dental professionals, one might expect this to be attributed to dental professionals being more critical or able to more keenly detect smaller variances in facial balance.[23] However, in this study, the layperson and orthodontic patient groups were actually found to be more critical than the orthodontic clinician, at least for the female profile ratings, and all three groups ranked similarly for the different male profiles presented. Overall, most of the groups had very similar rankings for the respective chin-throat lengths presented which may suggest that this particular facial parameter had such a remarkable effect on the profile that its evaluation is less influenced by the advanced training orthodontists receive compared to other facial attributes.

In a study conducted by the John Radcliffe Hospital, Oxford, United Kingdom, clinicians rated patients as needing orthognathic treatment higher than the patients themselves, and surgeons deemed even more so that surgical treatment was necessary.[24] The results of this study only found significant difference in the clinicians' greater desire to elect surgery versus the patient and layperson groups for the M1 – M3 profiles (C-T length 8mm – 18mm). For other male and female profiles, it was generally a higher percentage of the patient and layperson groups' desire for surgical correction than the orthodontic clinicians group. Although it can be expected that orthodontists and oral surgeons would be more sensitive in detecting facial or profile disharmonies based on the nature of their training, patient groups can also demonstrate a higher sensitivity than the norm due to either their own personal motivations for treatment, their patient education from the providers treating them and their overall treatment experiences. All of these factors appear to be consistent with the results of this study. A possible explanation for instances in which the layperson groups were more critical in their attractiveness ratings or

electing jaw surgery for profile improvement at a higher rate than the orthodontists, may be explained by shifting views on esthetics and an increase in self-perception or decrease in self-esteem, due to growing social media influence.[25]

The limitations of this study include sample size, evaluation of a non-traditional or not routinely studied facial parameter, use of a 100mm VAS, and an innovative study design with the use of color photographs as opposed to profile silhouette images. The literature search provided no previous studies that have evaluated the chin-throat length and the impact changes in length may have on an individual's appearance. There is also limited data that can be found to support if an established and generally accepted normative measurement for this facial parameter already exists. In regards to the attractiveness rankings, the authors chose to use a 100mm VAS as the rating mechanism in this study based on its simplicity and relative ease to submit quick responses mostly to avoid survey fatigue. Based on the number of questions being asked, and the lack of control in ensuring survey completion – since participation was anonymous and voluntary – the investigators preferred the benefits of the VAS over a Likert scale, for instance, to maximize the sample size. However, some disadvantages of using a VAS include the larger variation and standard deviation in the responses, inability to know if observers interpreted the anchor point descriptor words in the same manner, and the inability to discriminate how many millimeters of difference in rankings is clinically relevant.[21] Finally, most studies found in the literature search, evaluated facial esthetic parameters by having participants rate computer-generated silhouette images, that often fail to accurately represent an actual human face with the harsh lines and sharp angles created. The use of real human faces allows the ability to smooth lines and blend features even after manipulation for survey parameters to present a more realistic image, and thus may be more accurate for facial attractiveness focused studies. There are of

course benefits to silhouette images, in that they are able to remove extrinsic factors, such as complexion, hair styles, facial hair and other variables that can undoubtedly influence perceived attractiveness.[21]

Conclusions:

Orthognathic repositioning of the mandible will almost always serve to improve the functional occlusion, but depending on the original dentofacial deformity, can influence the airway space and esthetic submental soft tissues, either positively or negatively. Contrary to a skeletal class III correction which may involve mandibular setback surgery and adversely create a "double-chin" appearance, a class II skeletal profile may benefit from mandibular advancement or genioplasty advancement procedures to increase the chin-throat length and stretch the submental soft tissues more esthetically.[20] As such, it is important to properly evaluate the treatment goals of the lower third and all potential benefits that may come with either a surgical or non-surgical treatment option. While the submental-cervical angle is often considered during esthetic evaluation of the lower third, this study demonstrated that chin-throat length can significantly impact the overall appearance of an individual as well. It should be noted that the following conclusions and results of this study are based on the assumption that other key angles and measurements of the throat form and lower third evaluation were acceptable as was presented on the profiles of the study subjects. While it was necessary to isolate only one variable for proper evaluation, it is more likely in a clinical setting that several areas of facial imbalance will present together. Lower profile morphology is not only affected by dentofacial deformity, but also skin tonicity and neck strap muscular changes that occur with normal aging, or submental adiposity. The diagnosis and necessary treatment may also be multifactorial in

nature and thus may require adjunctive esthetic procedures in conjunction with orthognathics for optimal improvements.

- The results of this study demonstrate that longer chin-throat lengths (33 – 43mm) rendered the skeletal class II retrognathic profiles as esthetically acceptable for both female and male Caucasian subjects.
- When presented with a side-by-side comparison, overall study participants preferred the 38mm chin-throat length on both the female and male profile.
- For both males and females with overly convex profiles, chin-throat lengths ≤ 23mm were in general rated as below average (Mean ranks 13.91 – 55.90mm on 100mm VAS) by observers across all groups, and thus may represent a borderline esthetically acceptable C-T length.
- In regards to threshold values for the desire to elect surgical intervention, along with decreased attractiveness ratings, C-T lengths ≤ 13mm for both females and males suggest a surgical treatment plan should be considered.
- When evaluating patients for a surgical vs. non-surgical correction of a skeletal class II malocclusion, C-T length should be evaluated in addition to other routine facial angles during assessment of the lower profile morphology.
- All orthognathic treatment plans should consider the chin-throat length and how treatment may impact the esthetics of this area.

Figure & Captions:

Figure 1. (a). All eight female images generated (A – Dd) ranging sequentially from the longest, A = 43mm C-T length to the shortest, Dd = 8mm C-T length. While these images were presented together initially, when participants were asked to select the most attractive of the composite eight, subsequent questions presented only one male or female image in random order. **(b)** All male images generated (E – Hh) ranging sequentially from the longest, E = 43mm C-T length to the shortest, Hh = 8mm C-T length.

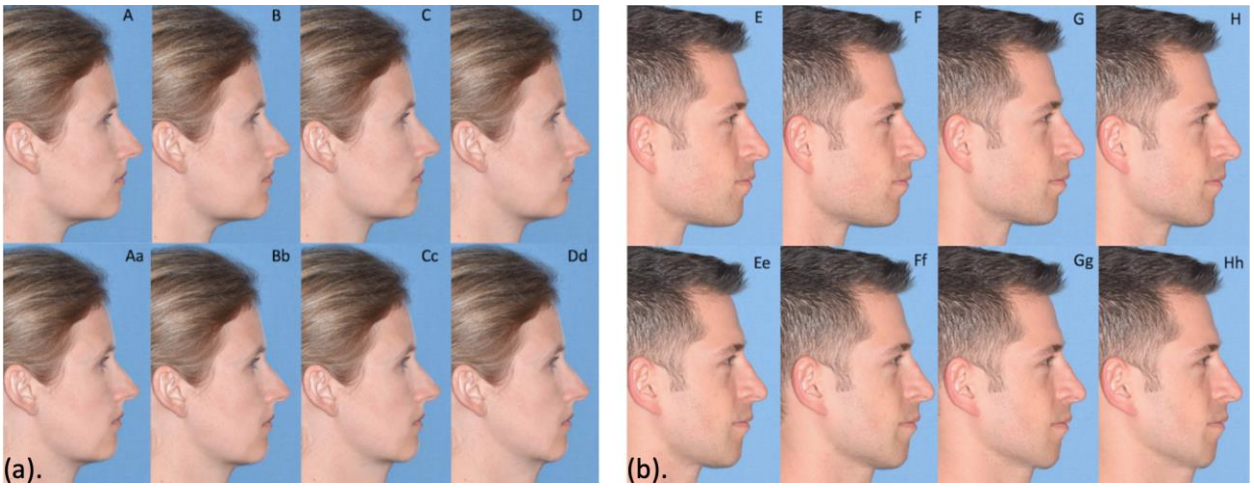


Figure 2. All images were calibrated using superimpositions of the patient's original lateral cephalometric radiographs with digital 100mm rulers and gridline measurements to adjust for any resizing and magnification errors. This process ensured the digital measurements would represent clinically applicable C-T lengths. Because the images had already had the facial convexities altered, the original lateral cephalometric radiographs would not adapt fully in the lower third.

Figure 3. Example of subsequent survey questions that repeated for each male and female photo, which were presented in random order.

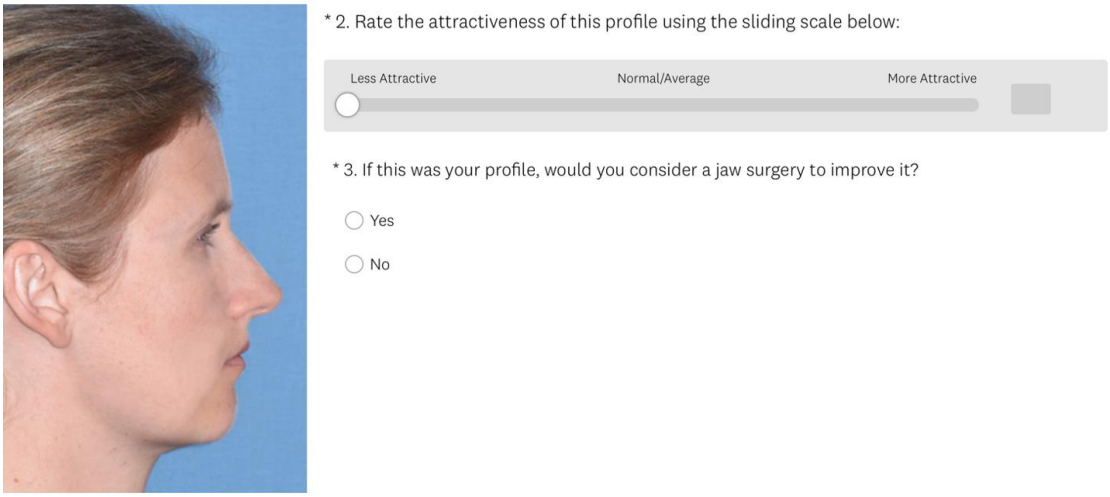


Figure 4. Demographics: Survey participants by group (Total n=261)

Observer Group	Number (n)	% Female	% Male	Age Range (yrs)	Mean Age (yrs)	Age Range Distribution	% White/ Caucasian
Orthodontic Clinician	98	47.96%	52.04%	25-65+	39.3	36% (25-34) 38% (35-44) 20% (45-54) 6% (55+)	81.63%
Orthodontic Patient	77	70.13%	29.87%	18 - 65+	37.6	13% (18-24) 29% (25-34) 38% (35-44) 12% (45-54) 5% (55-64) 3% (65+)	57.14%
Layperson	86	67.44%	32.56%	18 - 65+	42.2	2% (18-24) 22% (25-34) 42% (35-44) 16% (45-54) 15% (55-64) 2% (65+)	66.28%

Figure 5(a). Data Table: Female VAS Attractiveness Ratings & Surgical Desire by Group

			Orthodontists (n=98)		Patients (n=77)		Layperson (n=86)	
Female Profile	**Image Identifier**	**Chin-Throat Length (mm)**	**Mean Rank**	**Surgical Desire % Yes**	**Mean Rank**	**Surgical Desire % Yes**	**Mean Rank**	**Surgical Desire % Yes**
F8	A	**43**	72.5	1.0%	71.0	1.3%	70.9	4.7%
F7	B	**38**	73.9	0.0%	68.6	2.6%	67.5	3.5%
F6	C	**33**	73.4	0.0%	63.6	3.9%	63.6	4.7%
F5	D	**28**	64.6	1.0%	55.4	7.8%	58.5	4.7%
F4	Aa	**23**	51.1	7.1%	45.7	26.0%	47.2	16.3%
F3	Bb	**18**	47.7	14.3%	41.3	23.4%	45.9	18.6%
F2	Cc	**13**	25.5	65.3%	24.3	67.5%	26.5	53.5%
F1	Dd	**8**	20.2	71.4%	21.9	68.8%	21.1	59.3%

Figure 5 (b). **Bar Graph**: Female VAS Attractiveness Ratings

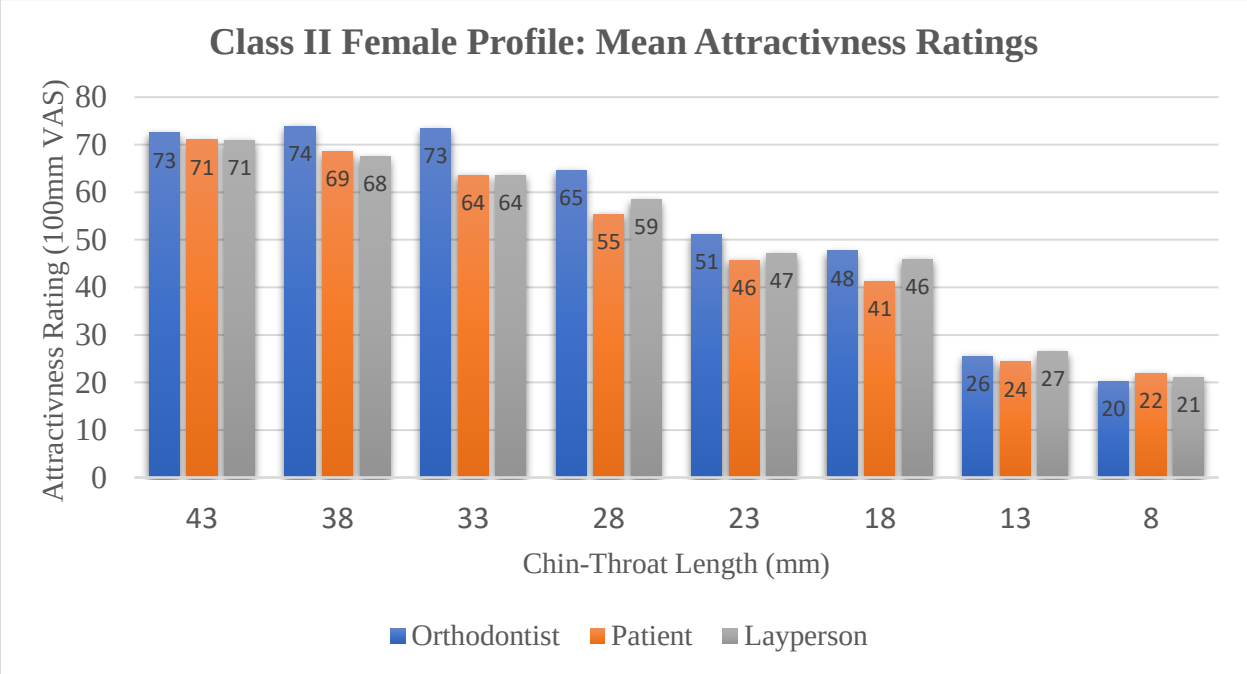


Figure 6 (a). Data Table: Male VAS Attractiveness Ratings & Surgical Desire by Group

			Orthodontists (n=98)		Patients (n=77)		Layperson (n=86)	
Male Profile	**Image Identifier**	**Chin-Throat Length (mm)**	**Mean Rank**	**Surgical Desire %Yes**	**Mean Rank**	**Surgical Desire %Yes**	**Mean Rank**	**Surgical Desire % Yes**
M8	E	**43**	67.9	1.0%	63.7	2.6%	65.5	1.2%
M7	F	**38**	70.6	1.0%	65.9	0.0%	66.4	2.3%
M6	G	**33**	67.0	2.0%	63.3	2.6%	63.7	4.7%
M5	H	**28**	59.9	2.0%	58.4	7.8%	58.2	1.2%
M4	Ee	**23**	55.9	8.2%	50.7	16.9%	49.8	9.3%
M3	Ff	**18**	39.5	40.8%	38.5	36.4%	41.4	20.9%
M2	Gg	**13**	22.6	75.5%	25.8	61.0%	24.5	50.0%
M1	Hh	**8**	14.2	90.8%	13.9	85.7%	16.7	73.3%

Figure 6 (b). Bar Graph: Male VAS Attractiveness Ratings

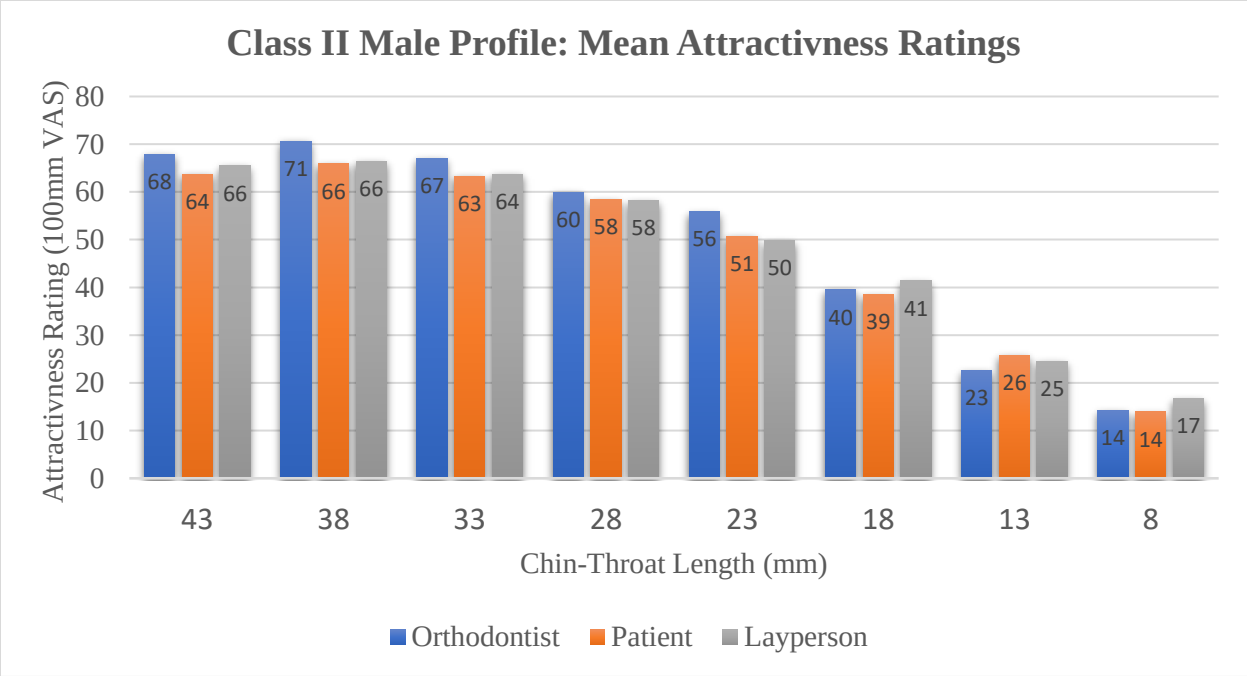
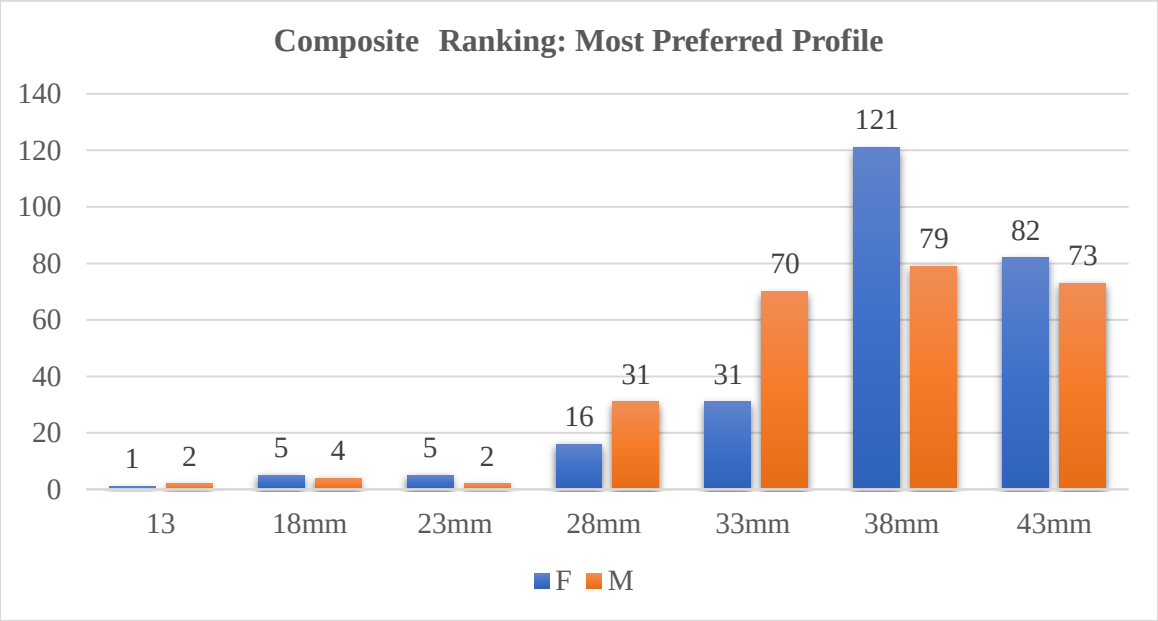


Figure 7. Bar Graph: Female and Male Profile Composite Rankings



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