

Differences between Male and Female Adolescents in the Smile Aesthetics Perceptions Regarding Smile Arc, Gingival Display, and Buccal Corridor

Chusnul Chotimah¹, Sigit Handoko Utomo², Maria Purbiati^{2*}

1. Undergraduate Program, Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia.

2. Department of Orthodontic, Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia.

Abstract

Smile aesthetics are one of the important criteria for evaluating the efficacy of orthodontic treatment. The purpose of this study was to assess the differences in the smile aesthetics perceptions of male and female adolescents regarding smile arc, gingival display, and buccal corridor. A selected photograph was modified digitally to obtain three different pictures for each variable. Smile aesthetic perceptions of 35 male and 35 female adolescents regarding the circum oral view were assessed using the Likert scale. There were no significant differences between the perceptions of the male and female adolescents regarding smile arc, gingival display, and buccal corridor. Consonant smile arc, low gingival display, and medium buccal corridor are believed to contribute to the most aesthetically pleasing smile.

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Introduction

Orthodontic treatment is one of the dentistry treatments that aims to improve the dentition value of patients with malocclusion, abnormal growth of the craniofacial bone complex, and neuromuscular malfunctions in the orofacial area.¹ Another objective of orthodontic treatment is to improve smile aesthetics.^{2,3} Owing to the paradigm shift in the attitude of the general public, smile aesthetics have become a major criterion for evaluating dental treatment.^{2,3}

Public perception regarding smile aesthetics depends on the individual perceptions regarding smile arc, gingival display, and buccal corridor. According to Hamka, each individual perception was influenced by the structural factor and the functional factor.⁴ Structural factors are those that are not the personal characteristics of an individual, such as race, demographic characteristics, education, socioeconomic status, social environment, and social norms. By contrast, functional factors are factors that are

inherently present in an individual, such as age, sex, personality, and personal experiences. These factors make the individual's perception of the aesthetic value subjective.⁴

As a child becomes an adolescent, he/she begins to interact with various environmental factors that lead to the formation and development of different personal, independent concepts, especially regarding certain aspects of their lives, such as aesthetic perception of personal appearance, including facial appearance.⁵ Based on a 2014 research by Samsonyanova and Broukal, psychosocial factors affecting the occlusion perception and the lack of self-confidence about one's appearance, especially about facial appearance are major factors that encourage an individual to seek orthodontic treatment.⁵ Moreover, according to the research reported by the Ministry of Health of the Republic of Indonesia, the prevalence of malocclusion in adolescents (12-17 years) reached 80%, with 59.15% requiring orthodontic treatment. These conditions are the cause of the increased demand and need for orthodontic treatment, especially in adolescents.⁶

In 2012, Miron et al. proposed the concept of sexual dimorphism of smile in men and women.⁷ Based on this concept, when smiling, the maxillary anterior teeth (in height) and gingival tissues are more visible in women than in men.⁷ In addition, this concept also

*Corresponding author:

Maria Purbiati
Department of Orthodontic
Faculty of Dentistry, Universitas Indonesia
E-mail: mariapurbiati@yahoo.com,
maria.purbiati@ui.ac.id

proposes that the mandibular incisor teeth are more visible when smiling in men than in women.⁷ The theories proposed in this concept were supported by other subsequent studies.⁷ Based on these studies, men and women have different perceptions regarding smile arc, gingival display, and buccal corridor.⁷

The perception of smile aesthetics also depends on race. This was proved by a research conducted by Al-Taki et al. in 2016 on an Arab population and by Diana et al. in 2012 on an African-origin population.^{8,9} Both studies were conducted to identify the perception regarding the buccal corridor in each race and found that in the Arab population, narrow buccal corridor was considered more aesthetic than medium or wide buccal corridor, while in the African-origin population, medium buccal corridor was considered more aesthetic than narrow or wide buccal corridor.^{8,9}

Based on these previous findings, further research on the differences in the aesthetic perception of male and female adolescents regarding smile arc, gingival display, and buccal corridor is warranted in Indonesia. Considering that most orthodontic patients are adolescents, orthodontic practitioners urgently need to obtain knowledge about their perceptions of these treatments to provide maximum functional and aesthetic value as well as treatment satisfaction. Moreover, to our knowledge, this is the first research exploring the differences in the perceptions of male and female adolescents of Indonesia regarding smile arc shape, gingival display height, and buccal corridor width.

Methods

This was a cross-sectional, observational study. Samples were consecutively and purposively selected in accordance with the inclusion criteria. Subjects aged 15-19 years who had an Indonesian origin (those who had antecedents, at least up to 2 generations, of the Indonesian ethnic group); resided in Indonesia; and were physically, mentally, and spiritually healthy were enrolled in the study. The study population comprised 35 male and 35 female adolescents (students of SMAN 4 Bekasi) who fulfilled the research inclusion criteria.

Tools and materials used in this research included a camera (SONY DSC H-200) with 20.1 megapixel resolution, image processing software

Adobe Photoshop CS4 2008, informed consent form signed by the research subjects that permitted the use of their data and photographs for the study, research explanation sheets, and the smile aesthetic perception questionnaire.

The research questionnaire consisted of 9 pictures of the circumoral view of the same photograph (of a woman) manipulated into 9 pictures through digital processing or the use of *Adobe Photoshop*. The photograph was obtained by placing the camera on a tripod at a distance of 90 cm from the subject. She was instructed to sit upright with a certain head position (facial horizontal Frankfurt plane parallel to the floor). The camera lens was adjusted to be parallel to the face midline and capture the entire face in the frontal aspect. She was instructed to say, "Chelsea eats a cheesecake in Chesapeake", relax for a while, and then smile immediately for the photo. After the photo was obtained,—it was cropped to retain only the circumoral area; thereafter, it was modified into 9 pictures (3 pictures of 3 types of smile arc [figure 1]; 3 pictures of 3 types of gingival display [figure 2]; and 3 pictures of 3 types of buccal corridor [figure 3]).



Figure 1. Photo conversion to obtain three types of smile arc.

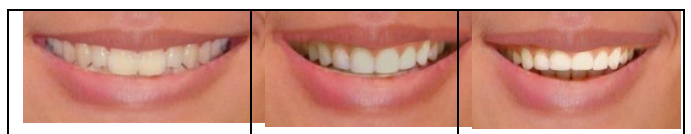


Figure 2. Photo conversion to obtain three types of gingival display.

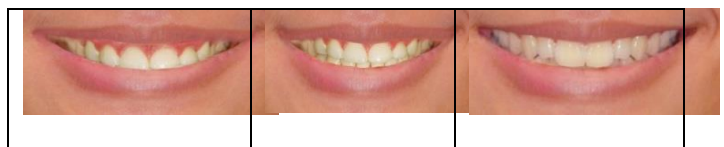


Figure 3. Photo conversion to obtain three types of buccal corridor.

The subjects were asked to give a score from 1 to 6 on the Likert scale, 1 being very good and 6 being very bad, as per their preference. The obtained data were analyzed using the Chi

Square test to know the differences in the perceptions of both the subject groups. The frequency distribution of the aesthetic perceptions of each group was assessed using univariate analyses.

Results

The smile arc perceived to be most aesthetic was the consonant smile arc. A higher number of subjects chose scores of 1 (very good) and 2 (good) for the consonant smile arc than for the other two smile arcs: flat and reverse smile arcs (table 1).

Table 1. Frequency distribution of male and female adolescents as per their perceptions regarding smile arc.

| Smile Arc | Perception Level | Male | | Female | |
|-----------|------------------|------|------|--------|------|
| | | N | % | N | % |
| Consonant | Very Good | 12 | 34,3 | 12 | 34,3 |
| | Good | 11 | 31,4 | 16 | 45,7 |
| | Fairly Good | 9 | 25,7 | 7 | 20,0 |
| | Fairly bad | 3 | 8,6 | 0 | 0 |
| | Bad | 0 | 0 | 0 | 0 |
| Flat | Very Bad | 0 | 0 | 0 | 0 |
| | Very Good | 5 | 14,3 | 1 | 2,9 |
| | Good | 6 | 17,1 | 13 | 37,1 |
| | Fairly Good | 8 | 22,9 | 14 | 40,0 |
| | Fairly Bad | 9 | 25,7 | 6 | 17,1 |
| Reverse | Bad | 7 | 20,0 | 1 | 2,9 |
| | Very Bad | 0 | 0 | 0 | 0 |
| | Very Good | 1 | 2,9 | 0 | 0 |
| | Good | 0 | 0 | 1 | 2,9 |
| | Fairly Good | 6 | 17,1 | 4 | 11,4 |
| | Fairly Bad | 9 | 25,7 | 6 | 17,1 |
| | Bad | 11 | 31,4 | 16 | 45,7 |
| | Very Bad | 8 | 22,9 | 8 | 22,9 |

The low gingival display was considered to be most aesthetic because more male and female subjects gave a score of 1 (very good) to the low gingival display than to the high and average gingival displays (table 2). Medium buccal corridor was perceived as most aesthetic by the study subjects. This was evident from the fact that the scores for medium buccal corridor were either 1 (very good), 2 (good), or 3 (fairly good), while the other buccal corridors were scored from 1- 4 (for narrow buccal corridor) and 1-5 (for wide buccal corridor) (table 3).

Table 2. Frequency distribution of male and female adolescents as per their perceptions regarding gingival display.

| Gingival display | Perception Level | Male | | Female | |
|------------------|------------------|------|------|--------|------|
| | | N | % | N | % |
| High | Very Good | 1 | 2,9 | 0 | 0 |
| | Good | 4 | 11,4 | 2 | 5,7 |
| | Fairly Good | 7 | 20,0 | 9 | 25,7 |
| | Fairly Bad | 13 | 37,1 | 7 | 20,0 |
| | Bad | 7 | 20,0 | 13 | 37,1 |
| Average | Very Bad | 3 | 8,6 | 4 | 11,4 |
| | Very Good | 1 | 2,9 | 0 | 0 |
| | Good | 6 | 17,1 | 5 | 14,3 |
| | Fairly Good | 13 | 37,1 | 11 | 31,4 |
| | Fairly Bad | 6 | 17,1 | 12 | 34,3 |
| Low | Bad | 8 | 22,9 | 6 | 17,1 |
| | Very Bad | 1 | 2,9 | 1 | 2,9 |
| | Very Good | 13 | 37,1 | 19 | 54,3 |
| | Good | 13 | 37,1 | 10 | 28,6 |
| | Fairly Good | 6 | 17,1 | 5 | 14,3 |
| | Fairly Bad | 1 | 2,9 | 1 | 2,9 |
| | Bad | 2 | 5,7 | 0 | 0 |
| | Very Bad | 0 | 0 | 0 | 0 |

Table 3. Frequency distribution of male and female adolescents as per their perceptions regarding buccal corridor.

| Buccal corridor | Perception Level | Male | | Female | |
|-----------------|------------------|------|------|--------|------|
| | | N | % | N | % |
| Narrow | Very Good | 9 | 25,7 | 7 | 20,0 |
| | Good | 19 | 54,3 | 12 | 34,2 |
| | Fairly Good | 5 | 14,3 | 8 | 22,9 |
| | Fairly Bad | 2 | 5,7 | 8 | 22,9 |
| | Bad | 0 | 0 | 0 | 0 |
| Medium | Very Bad | 0 | 0 | 0 | 0 |
| | Very Good | 9 | 25,7 | 5 | 14,3 |
| | Good | 15 | 42,9 | 19 | 54,3 |
| | Fairly Good | 11 | 31,4 | 11 | 31,4 |
| | Fairly Bad | 0 | 0 | 0 | 0 |
| Wide | Bad | 0 | 0 | 0 | 0 |
| | Very Bad | 0 | 0 | 0 | 0 |
| | Very Good | 9 | 25,7 | 8 | 22,9 |
| | Good | 11 | 31,4 | 14 | 40,0 |
| | Fairly Good | 11 | 31,4 | 9 | 25,7 |
| | Fairly Bad | 4 | 11,4 | 2 | 5,7 |
| | Bad | 0 | 0 | 2 | 5,7 |
| | Very Bad | 0 | 0 | 0 | 0 |

Table 4. Differences in the perceptions of male and female adolescents in SMAN 4 Bekasi with respect to buccal corridor, gingival display, and smile arc.

| Smile Component | | Perception Level | | p-Value |
|------------------|-----------|------------------|----------------|---------|
| | | Male Average | Female Average | |
| Buccal corridor | Narrow | 2,00 | 2,49 | 0,106 |
| | Medium | 2,06 | 2,17 | 0,446 |
| | Wide | 2,29 | 2,31 | 0,922 |
| Gingival display | High | 3,86 | 4,23 | 0,208 |
| | Average | 3,49 | 3,63 | 0,571 |
| | Low | 2,03 | 1,66 | 0,141 |
| Smile arc | Consonant | | | |
| | Flat | 2,09 | 1,86 | 0,397 |
| | Reverse | 3,20 | 2,86 | 0,134 |
| | | 4,51 | 4,74 | 0,422 |

*1=Very good; 2=Good; 3=Fairly good; 4=Fairly bad; 5=Bad; 6=Very bad. **significant at $p < 0,05$

However, these differences in the perceptions of the two groups were not statistically significant. The perceptions of the male and female subjects were not significantly different for any of the smile components (all p values > 0.05); therefore it can be concluded that the overall smile perception of male and female subjects was not significantly different.

Discussion

The consonant smile arc was perceived as the most aesthetic smile arc by both, male and female subjects, while the reverse smile arc was scored as the most unaesthetic smile arc. In addition, the flat smile arc was given better scores by the female subjects than by the male subjects. This result is not in agreement with that of the 1992 study by Peck et al. wherein the flat smile arc was found more attractive by the male subjects than by the female subjects.⁹

This difference may be attributable to the difference in the ages of the study subjects. Moreover, these differences may also be owing to the tendency of the the curvature of incisal edges of upper anterior teeth to be more flat in men than in women. This finding was in agreement of that of the study by Balani et al. in 2014, which stated that 54% of male subjects had a flat smile arc.¹⁰ The differences in the assessed perceptions regarding smile arc in this study and previous studies may be attributable to factors such as the shape of the six anterior incisor teeth.¹⁰ When assessing a smile, an

individual generally pays attention to the shape of the six anterior teeth.¹⁰ These contribute to the masculine or feminine characters of a person. Based on a research conducted by Heravi et al. in 2011, female subjects preferred rounded teeth compared to male subjects.¹¹ The differences in the results of our study and those of previous researches could be attributable to the differences in the perceptions of male and female subjects with respect to the shape of the six anterior teeth that was a factor in the questionnaire.

Both, male and female subjects preferred low gingival display to average or high gingival display. However, in our study, male subjects gave a better score to high gingival display than the female subjects. This result differs from the results of several previous researches where in the male subjects were found to consider high gingival display unaesthetic.¹² This difference could be due to the differences in the subjects' ages; our study included adolescents (15-19 years), while the previous research included adults (20-30 years).¹² Gingival tissue height can be influenced by the growth in soft tissues such as the lips.

With age, the lips droop and the outer red part of the lip reduces, giving the appearance of reduced lip tissue mass.¹³ In addition, in our study, male subjects gave better scores to the higher gingival display than the female subjects. This was different from the results of a research by Silvia et al. in 2005 wherein the female subjects gave a better score to high gingival display than the male subjects.¹² This may have been due to the racial differences (known to influence individual aesthetic perceptions) among the research subjects.

Both, male and female subjects preferred medium buccal corridor to the others. As shown in table 3, male subjects gave better scores to the narrow buccal corridor than the female subjects. In addition, female subjects also preferred the wide buccal corridor to the narrow buccal corridor. Both these results are different from those of a previous study conducted by Nascimento et al. in 2012. In his research, Nascimento et al. have explained that the narrow buccal corridor is more acceptable to female subjects than to male subjects, and the wide buccal corridor is more acceptable to male rather than female subjects.⁹

The results of the present study can be attributed to the narrower intercanine distance in women compared to that in men ($33,49 \pm 1,49$ mm v/s $35,22 \pm 1,54$ mm) that is responsible for the wider buccal corridor size in women compared to that in men.⁹

An individual's perception of the aesthetic value is influenced by many factors, and in this research, the perceptions of male and female subjects were compared. However, the aesthetic perceptions were not significantly different across sexes. The lack of significant differences in the perceptions of the male and female subjects can be attributed to the very strict inclusion and exclusion criteria. A significant difference may be found if the factors that influence an individual's perception, such as race, education level, social environment, and economic status were not affected by the inclusion and exclusion criteria.

Conclusion

There were no statistically significant differences between the perceptions of the male and female adolescent subjects in Indonesia with respect to smile arc, gingival display, and buccal corridor. The consonant smile arc was considered to be most aesthetic by both groups. Female subjects gave better scores for the flat smile arc than male subjects. Low gingival display was considered as the most aesthetic by both study groups. High gingival display was scored better by male subjects than by female subjects. Both groups considered the medium buccal corridor as the most aesthetic buccal corridor. Male subjects gave better scores for narrow buccal corridor than female subjects, while the wide buccal corridor was scored better by female subjects than by male subjects.

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Declaration of Interest

The authors report no conflict of interest.

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