

## Contrasting perceptions of male and female dental students regarding smile aesthetics based on their gingival display

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### ABSTRACT

**Background:** Perception consists of personal opinion in relation to an object. In terms of aesthetics, perception normally differs from one individual to another based on several factors such as gender. When expressing emotion, a smile is the most important facial expression whose aesthetics are constructed from a number of components, including gingival display. **Purpose:** This study aimed to establish the comparative perceptions of the smile aesthetics of male and female dental students based on their gingival display. **Methods:** 36 dental students, divided equally according to gender, were enrolled in this study. Photographic images of the smile of each subject were taken from a frontal direction with a Canon EOS 700D digital camera and subsequently printed. Assessments were conducted by comparing the photographs of subjects from the perspective of smile references based on the gingival display, followed by subject scoring on the basis of smile classification. Assessments were conducted twice within a two-week period to confirm test reliability. The data collected was analyzed by means of kappa statistic and U-Mann Whitney tests. **Results:** The test results indicated that all subjects demonstrated a coincidence in their analysis ( $\kappa=0.84$ ). Statistical analysis showed that a score of 0.902 ( $p>0.05$ ) had been produced by a U-Mann Whitney test. **Conclusion:** It can be concluded that no difference exists between male and female students in the perception of smile aesthetics based on the gingival display.

**Keywords:** gingival display; perception of aesthetic; smile aesthetics

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### INTRODUCTION

The analysis of a smile in relation to the surrounding soft tissues has assumed a major role in the transformation of the aesthetics paradigm within the field of orthodontics. Having conducted several studies of facial alteration affecting aesthetic quality, orthodontists have found that a balanced smile is frequently adopted as a guideline in orthodontic treatment.<sup>1</sup> Therefore, it is crucial to identify an instrument reliable in overcoming subjectivity when evaluating aesthetics. In the field of orthodontics, it is important to recognize the factors which disrupt a smile and influence the diagnosis of potential abnormalities when deciding on the treatment plan.<sup>2</sup>

Orthodontic treatment is the branch of dentistry intended to improve the structure of the teeth in order to enhance mastication, phonetics and aesthetics.<sup>3</sup> When

seeking orthodontic treatment, patients normally cite facial aesthetic factors, both highly individual and subjective in nature, as their main motivation.<sup>4,5</sup> An aesthete aims to create beauty and attraction to improve self-esteem and satisfaction with specific parts of their own body in order to experience greater confidence that he/she will be more appreciated by society.<sup>6</sup> It is recognized that each individual can possess a specific mechanism to assess him/herself as well as others in terms of appearance and aesthetics.<sup>5</sup>

Perception constitutes the opinion or response of an individual to an object which strongly affects his/her character and behaviour in relation to it. Perceptions of certain stimuli will differ from one individual to another.<sup>7</sup> In terms of the perception of aesthetics, it is very possible that individual experiences and socio-cultural environment play a major role. Gender, socio-economic background and age are known to be factors influencing perceptions

of tooth display.<sup>8</sup> It has been found that females tend to be less satisfied with their smiles than males, rendering them generally more aware, sensitive and concerned when it comes to appearance. It is, thus, proven that females pay more attention to aesthetics.<sup>6</sup>

It is widely accepted that the smile plays an important role in both facial expression and appearance. There are three aspects of smile aesthetics, namely; gingival display, visibility of the smile curve line, and the buccal corridor.<sup>9</sup> Gingival display is the relationship between lips and the visibility of the gingiva tissues and teeth.<sup>10</sup> It is accepted that a smile with minimal gingival display is considered to be more aesthetically pleasing compared to excessive gingival display or a gummy smile.<sup>9</sup>

The results of research conducted in 2010 by the School of Dentistry at the Federal University of Pelotas, Brazil shows that, in terms of self-perception of their smile aesthetics, females tend to be less satisfied than males. It shows that gender influences the perception of an individual regarding the appearance of his/her dental aesthetics.<sup>6</sup> However, research on the same subject based on buccal corridors and the smile curve line conducted at the University of Jordan showed that there is no difference between males and females in terms of perception when assessing smile aesthetics.<sup>1</sup> The present study was carried out to compare the perceptions of male and female dental students with regard to the aesthetics of smiles based on gingival display.

## MATERIALS AND METHODS

This research falls within the descriptive analytical category featuring 36 subjects divided into two groups, female and male. The number of research subjects in each group was adjusted according to their availability, namely 18 male and 18 female participants who attended the Faculty of Dentistry at Universitas Gadjah Mada during the 2014-15 academic year. It was confirmed that none of the research subjects were either currently undergoing or had previously undergone any of the following forms of orthodontic treatment: Class I Angle malocclusion, overbite and overjet ranging between 2–4 mm and a mild crowding and that they were all willing study participants. A Canon digital camera (Canon EOS 700D 18.0 megapixels, Japan), a tripod (Excell Promos, China), a laptop (HP®Pav14, Japan) and a printer (Canon E510, Vietnam) were employed during the conduct of this research.

The research was approved by the Ethics Sub-committee of the Universitas Gadjah Mada Ethics Commission which assigned the number 00959/KKEP/FKG-UG/EC/2017. Research subject selection had been agreed by the Ethics Committee, Faculty of Dentistry, Universitas Gadjah Mada. The research procedure was explained to the selected participants who confirmed their understanding by signing letters of informed consent. During the photo shoot session, a Canon EOS 700D was positioned on a

tripod 91 cm from the subjects, as recommended by the American Academy of Cosmetic Dentistry Photographic Accreditation Review.<sup>11</sup> The height of the camera lens was at the eye level of the subject on whom it was focused with the setting on autofocus at ISO 200. Subjects posed in an upright seated position in a backless chair, looking at the camera with their central occlusal teeth parallel to the floor and their facial muscles relaxed. Subjects were trained to smile broadly before a frontal photograph of the extraoral was taken.

The photo shoot session results were transferred from the camera to an HP®Pav14 laptop where they were placed adjacent to the smile reference pictures featuring the gingival display before being printed on a Canon A510 printer. Each subject assessed all the smile photographs (printed forms) by comparing the photographs of the subjects with the smile reference pictures based on the criterion of gingival display. Subjects chose one of the reference pictures based on the gingival display which they considered most similar to the picture of their own smile. Subjects subsequently made an assessment on a scale of 1 to 4 based on the smile classification (Figure 1), namely; 1) very high smile indicated by the width of the smile margin of the gingival upper jaw or apical to cement-enamel junction being more than two millimetres, 2) high smile line with the gingival upper jaw margin (apical to the cements-enamel junction) measuring more than two millimetres, 3) average smile line in which only a gingival embrasure is visible, 4) low smile line in which the gingival embrasure and cements-enamel junction is not visible.<sup>12</sup>

The research subjects underwent re-assessment after two weeks to establish whether any difference existed between the first and the second assessment. In cases where a difference existed, a re-assessment process was undertaken two weeks after the second assessment with the average being calculated from the data collected. The data was subsequently analyzed by means of kappa-statistic and U-Mann Whitney tests. *p*-values <0.05 were considered statistically significant.

## RESULTS

The results provided by the subjects formed two sets of assessment data, perception assessments I and II, relating to their perceptions of an ideal, gingival display-based smile. The kappa statistic was employed in order to establish the reliability between the intra-examiner and inter-examiner results produced by assessment I and II, calculated by dividing the number of agreement scores by the total number of scores. All examiners demonstrated an extremely high level of agreement in both their intra-examiner and inter-examiner analysis ( $\kappa = 0.84$ ). The results confirmed that there was no difference between the first and the second assessments. Thereafter, a U Mann-Whitney test was conducted to establish whether any contrast existed between male and female perceptions of their gingival

display. The U Mann-Whitney test value was 0.902, signifying the absence of male-female difference (Table 1). This result, in turn, implied that no difference existed in the perceptions of members of either gender. Based on the contents of Table 1, the male responses were similar to those of females in that their assessment of the smiles of subjects in classification 3 was 44.44%, while that of their female counterparts was 41.67%.

## DISCUSSION

The kappa statistic results indicate the lack of difference between perception assessments I and II. The test results were potentially influenced by several factors, including: 1) all subjects were given a comprehensive explanation of how to assess a smile based on gingival display before conducting an assessment, 2) all subjects were current dentistry program students, thereby ensuring shared background knowledge of smile aesthetics. Examination of the results indicated that males and females demonstrated similarity with regard to frequency and test percentages; the highest frequency and percentage occurring in classification three (average smile line), while the lowest frequency and percentage related to classification four (very high smile line). The results reported here are supported by research on smile aesthetics perception conducted by the students of the Faculty of Dentistry, University of Valencia, Spain which concluded that no difference existed between males and females when assessing smile aesthetics. Both genders

considered that the most attractive smile aesthetic to be one in which the gingival display is no longer than 2 mm, while the least appealing is a smile with a gingival display greater than 2 mm in length.<sup>13</sup> The similarity between the male and female assessments can, potentially, be influenced by their shared background knowledge, as dentistry students, of the subjects. It is also generally accepted that dentistry students pay more attention to the factors influencing smile aesthetics and that their high assessment of smile aesthetics is possibly influenced by their background knowledge, both clinical and theoretical, related to tooth aesthetics and their thorough understanding of factors influencing smile aesthetics.<sup>14</sup>

The mode test data indicated that the mode of the male and female groups is similar in classification 3. It is possible that this comparability is influenced by the shared background knowledge of the subjects as dentistry students in the area of smile aesthetics. It is also supported by research on the comparison of the smile aesthetics perception of orthodontists and dentistry students based on gingival display at the Faculty of Dentistry, Kyushu University, Japan. The results show that no difference existed between the aesthetic assessment of the male and female members of each group, suggesting that dentistry students tend to be less accepting of gingival display. The study also reported that, in their opinion, the most interesting smile was one in which two millimetres of the upper lip covers the upper jaw incisivus (average smile line).<sup>15</sup>

There is a difference in the aesthetic perception of males and females. Female teenagers pay more attention



**Figure 1.** Smile classification based on gingival display: (1) very high smile line, (2) high smile line, (3) average smile line, (4) low smile line

**Table 1.** Percentage of buccal corridor value for each group and a comparison of U Mann-Whitney test results of the two groups tested

Classification of gingival display	Number of choice (Percentage of classification of gingival display)		p-value
	Male	Female	
1	5 (13.89)	4 (11.11)	0.902
2	9 (25)	10 (27.78)	
3	16 (44.44)	15 (41.67)	
4	6 (16.67)	7 (19.44)	
Total	36 (100)	36 (100)	

Notes: 1) very high smile line 2) high smile line 3) average smile line 4) low smile line.

to aesthetics, including healthy teeth, as a result of their considering themselves to have an unsatisfactory facial shape.<sup>16</sup> Females tend to be less satisfied with their smile compared to males which strongly suggests that they are more self-conscious about their appearance.<sup>6</sup> A body of research shows that females tend to value aesthetics more than males,<sup>17</sup> while also highlighting the fact that there is no difference in either test frequency or assessment mode between groups. The similarity of the assessment suggests that females are not more aware of, sensitive to or concerned about aesthetic considerations compared to males. The attention paid to aesthetics is also related to the satisfaction of subjects regarding this aspect. The major factor influencing research is the background knowledge of subjects as faculty of dentistry students who tend to pay more attention to dental aesthetics during their university studies, a fact obviously affecting their perception of facial aesthetics.<sup>8</sup> This conclusion is also supported by research into the perception and level of satisfaction regarding dental aesthetics on the part of students in Saudi Arabia which showed that, based on a satisfaction assessment index, no differences exist between satisfaction levels in males and females regarding their dental aesthetics.<sup>18</sup>

Age control and orthodontic treatment experiences also influence the assessment result of the subject. Young people appear to pay more attention to dental aesthetics compared to their elders.<sup>6</sup> In this research, the subjects of the study were 18-21 year old students. The extremely limited age range made it possible that insignificant assessment differences would exist between the female and the male groups.<sup>19</sup> Other possible factors influencing the assessment of the subject included individual experiences of which orthodontic treatment is an example. It is believed that orthodontics treatment affects the perception of aesthetics harboured by an individual. As for the subjects of this study, it was confirmed that all participants were neither undergoing orthodontic treatment, nor had any experience of such previous treatment. Therefore, it was possible that both female and male groups had the same perception of assessing aesthetics.<sup>20</sup> The result of the study conducted here is supported by related research which confirmed no difference between males and females when assessing smile aesthetics based on their buccal corridor.<sup>7</sup>

The weaknesses of the study are also presented here, including: the clinical crown lengths of the incisors of the subjects being neglected and the smile aesthetics only being observed and examined based on the gingival display. The assessment of smile aesthetics based on the gingival display in this piece of research took account of several factors such as disproportionate vertical maxillary growth, excessive upper lip muscle and the clinical crown height of the maxillary incisive teeth.<sup>21</sup> One important parameter in assessing smile aesthetics based on gingival display is the maxillary incisivus length and width ratio.<sup>22</sup> In cases where the clinical crown length of the incisors appears shorter, possible causes include attrition or an excessive

gingiva. Smile aesthetics are examined on the basis of many factors and smile with excessive gingival display is not the only category used to determine the presence or otherwise of smile aesthetics.<sup>23</sup> It is important to examine smile aesthetics from several perspectives in order to best decide what treatment should be undertaken based on aetiological causes. It can be concluded that male and female dental students share the same perception of an aesthetic smile with regard to its gingival display.

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