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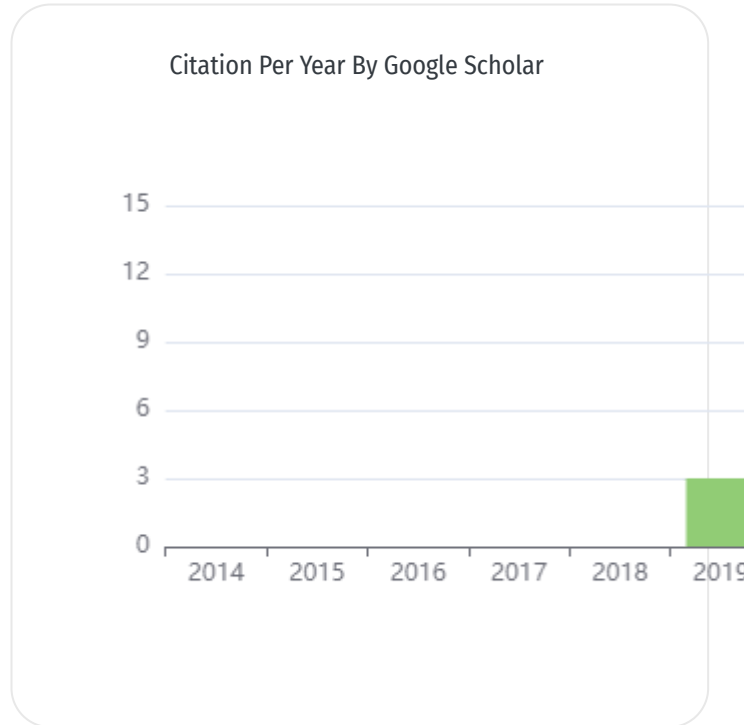
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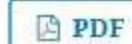
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Research Article

# Perceptions Differences in Smile Attractiveness Between Dental Students' and Lay Persons'

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## KEYWORDS

perception;  
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smile symmetry;  
smile types

## ABSTRACT

**Introduction:** Orthodontic treatment is performed to improve dental alignment, function, oral health, dentofacial stability and to achieve better facial esthetics. People tend to seek orthodontic treatments for a more esthetically attractive smile. Several parameters are used to measure the attractiveness of smiles, including the smile arc, smile line, buccal corridor or smile type, and smile symmetry. Perceptions of the various aspects of smile attractiveness may differ among patients and dentists, so dentists must understand patients' perceptions of the aspects of smile attractiveness in order to provide satisfactory care. **Objective:** To determine if there are differences in the perceptions of dental students and lay persons regarding the aspects of smile attractiveness. **Methods:** This is an analytical observational study with a cross-sectional research design. This study was conducted by distributing questionnaires containing 11 photographs of manipulated smiles to 50 students currently training to become dental professionals and 50 lay persons. The data were analyzed using an independent t-test. **Results:** A significant difference in perception ( $p < 0.05$ ) found in the smile line parameter. However, there were no significant differences in perception ( $p > 0.05$ ) with regard to smile arc, smile type, or smile symmetry parameters. **Conclusions:** Dental students and lay persons have different perceptions regarding smile line but share the same perception of smile arc, smile types, and smile symmetry.

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## INTRODUCTION

In recent decades, knowledge of dentistry and orthodontic treatments have greatly improved among the public, which has led to an increased awareness that teeth are not only a means of chewing food but also play an important role in the appearance and esthetics of a person's face.<sup>1</sup> Most patients' motivation for seeking orthodontic treatments is to improve their facial esthetics, particularly to achieve a more attractive and beautiful smile.<sup>2-4</sup>

Smiles play a very important part in everyday life because they are a means of non-verbal communication used to show expressions and feelings.<sup>5,6</sup> An attractive smile has a positive impact on a person's social life. Smiles are divided into two classifications: the posed or social smile, which is shown while greeting someone, and the unposed or spontaneous smile, which is shown spontaneously while laughing or as a sign of pleasure.<sup>3</sup>

Dental and face esthetics can be analyzed using macro-, mini-, or micro-esthetics approaches. Macro-esthetic analysis is the examination of the face's proportions in three planes of space, while mini-esthetic analysis is the examination of the vertical relationship of the teeth to the soft tissues when a person smiles, including the smile arc, the gingival and anterior tooth display, and the amount of the dark spaces displayed between the most posterior maxillary teeth and the commissures of the lips which is known as buccal corridor.<sup>7</sup> Smile symmetry is said to be one of the components of mini-esthetics used to rate the attractiveness of a smile in a dentofacial analysis.<sup>8</sup> Finally, micro-esthetic analysis examines the appearance of the teeth with regard to tooth proportion, the correction of black triangles, problems with tooth shade and color, and the shape of the gingiva.<sup>7</sup>

There are specific characteristics in each aspect of smile attractiveness that are considered to be the most attractive.<sup>8</sup> Dentists should be cautious in determining the references they use to improve the smile esthetics of their patients, because perceptions of beauty are subjective.<sup>3,4,9</sup> A previous study revealed that there are frequent disputes between dentists and lay persons regarding dental esthetics.<sup>10</sup> These differences in perception can be affected by several factors, such as age, gender, culture, social environments, experiences and knowledge, level of education, and trends that are popularized via the media.<sup>4,10</sup> Dental students study the oral cavity as well as its esthetics. Although they interact directly with patients to apply the knowledge they have learned, their perceptions of the various aspects of smile attractiveness could differ from that of their patients.<sup>11</sup> It is an important area of research to help future dentists ensure

that they understand their patients' perceptions of what constitutes an attractive smile in order to provide satisfactory care for their patients and avoid potential legal disputes. For these reasons the author wanted to determine whether there are differences in perceptions of the various aspects of smile attractiveness between dental students and lay persons.

## MATERIALS AND METHODS

This study was approved by the Ethics Committee Faculty of Dentistry Trisakti University (ethical clearance number 398/S1/KEPK/FKG/9/2020) and conducted in the Faculty of Dentistry Trisakti University Dental Hospital. The photograph of the model whose smile was modified in this study was obtained using a Nikon Coolpix P610 DSLR (Digital Single Lens Reflex) camera (Nikon Corporation, Tokyo, Japan). The photograph was then reproduced and modified into 11 images of four different smile aspects using Adobe Creative Cloud Photoshop CC 2017 software (Adobe Inc, San Jose, CA). The four smile aspects that were evaluated are smile arc (parallel, straight, and reversed), smile line (low, medium, high), smile fullness (narrow, medium, and broad), and smile symmetry (symmetrical and asymmetrical) (Figures 1-4). These different smile images were inserted and used in the questionnaire. The respondents were asked to score each image using the Visual Analogue Scale, where 1 indicated a very unattractive smile and 10 indicated a very attractive smile. The total scores were then calculated for each smile attractiveness aspect.

The sample size calculation was done before subjects recruitment started. The sample population for this study comprised of 50 dental students enrolled at Faculty of Dentistry Trisakti University and 50 lay persons from various backgrounds (students enrolled in other faculties in Trisakti University, entrepreneurs, auditors, soldiers, teachers, musicians, photographers, engineers, lawyers, etc). The participants' ages ranged from 20 to 25 years were randomly recruited online, all subjects understand and agreed to the research informed consent by completing the Google Forms (Google LLC, Mountain View, CA).

## Statistical Analysis

The questionnaire was tested for validity and reliability using the Pearson correlation coefficient and Cronbach's alpha. After all data were collected, they were evaluated using the Kolmogorov-Smirnov test for normality. The data were found to be normally distributed, so they were analyzed using the independent t-test. All tests were done using SPSS for Windows version 23 (IBM, Armonk, NY).



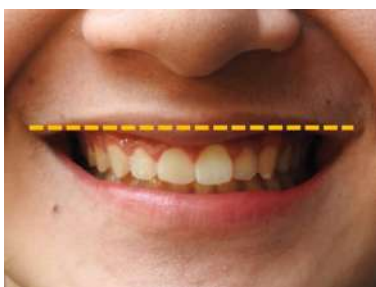
**Figure 1.** Smile arc aspect



**Figure 2.** Smile line aspect



**Figure 3.** Smile fullness aspect



**Figure 4.** Smile symmetry aspect

## RESULTS

Of the 100 respondents who filled out the questionnaire, 50 respondents were dental students and 50 other lay persons. Demographic profile of the respondents can be seen in Table 1. The questionnaire validity test showed that the counted  $r$  values ranged from 0.591 to 0.894, while the  $r$  table value used was 0.04438, indicating that all of the items included in the questionnaire were valid. The Cronbach's alpha value for the questionnaire reliability test was 0.892, indicating that all of the questionnaire items were reliable.

Regarding smile arcs, fifteen dental students and eight lay persons gave the highest score to the parallel smile arc; Twenty-nine dental students and twenty-three lay persons gave the highest score to the straight smile arc; two dental students and three lay persons gave the highest score to the reversed smile arc; one dental student and eleven lay persons gave all types of smile arc the same score. One dental student and five lay persons gave the highest scores to both the parallel and straight smile arcs, and two dental students gave the highest scores to both the straight and reversed smile arcs (Table 2).

Regarding the smile line, five dental students and three lay persons gave the highest score to the low smile line position; Thirty three dental students and seventeen lay persons gave the highest score to the medium smile line position; and nine dental students and sixteen lay persons gave the highest score to the high smile line position. One dental student and seven lay persons gave all three types of smile line positions the same score; two dental students and one lay person gave the highest score to both low and medium lip line positions; one lay person gave the highest scores to both low and high smile line positions; and five lay persons gave the highest scores to both medium and high smile positions (Table 3).

In their evaluations of smile fullness, three dental students and six lay persons gave the highest score to the narrow smile; Twenty-nine dental students and ten lay persons gave the highest score to the medium smile; Fourteen dental students and seventeen lay persons gave the highest score to the broad smile. Sixteen lay persons gave all three types of smile fullness the same score. One dental student gave the highest score to both narrow and medium smiles, while three dental students and one lay person gave the highest score to both medium and broad smiles (Table 4).

Regarding smile symmetry, forty three dental students and forty lay persons gave the highest score to the symmetrical smile. Five dental students and two lay persons gave the highest score to the asymmetrical smile; while two dental students and lay persons gave the highest score to both the symmetrical and asymmetrical smiles (Table 5).

The Kolmogorov–Smirnov normality test revealed that the data for every smile attractiveness aspect were normally distributed ( $p > 0.05$ ), thus the parametric independent t-test was used for a further round of analysis. A significant difference in perception ( $p < 0.05$ ) between dental students and lay persons was found with regard to the smile line, but there were no significant differences with regard to smile arch, smile fullness, or smile asymmetry aspects between the two groups (Table 6).

The dental students gave lower average scores (mean  $\pm$  SD) to the smile arc images ( $17.36 \pm 3.61$ ) compared to the lay persons ( $18.66 \pm 4.52$ ), respectively. In assessing the smile line images, the dental students also gave a lower average score ( $17.86 \pm 3.93$ ) compared to the lay persons ( $19.84 \pm 3.89$ ). Regarding smile fullness, dental students again gave a lower average score ( $18.88 \pm 3.67$ ) compared to the lay person ( $19.48 \pm 4.79$ ). Finally, in their evaluation of smile symmetry, the dental students gave a higher average score ( $12.14 \pm 2.78$ ) compared to the lay persons ( $11.46 \pm 3.87$ ) (Table 6).

**Table 1.** Demographic profile of research respondents

	Dental Students	Lay person
Age $\pm$ SD (years)	23.08 $\pm$ 0.94	22.16 $\pm$ 1.30
Sex		
Male	17	29
Female	33	21
Profession		
Dental profession program student	50	
University student		21
Private employee		9
University fresh graduate		6
Freelancer		2
Entrepreneur		2
Information technology expert		2
Beautician		1
Auditor		1
Soldier		1
Teacher		1
Photographer		1
Musician		1
Engineer		1
Lawyer		1

**Table 2.** Types of smile arc aspect that were given the highest scores

Types of Smile Arc Aspect	Dental Students	Lay person
Parallel	15	8
Straight	29	23
Reversed	2	3
Parallel, straight, and reversed	1	11
Parallel and straight	1	5
Straight and reversed	2	0
Parallel and reversed	0	0

**Table 3.** Types of smile line aspect that were given the highest scores

Types of Smile Line Aspect	Dental Students	Lay person
Low	5	3
Medium	33	17
High	9	16
Low, medium, high	1	7
Low and medium	2	1
Low and high	0	1
Medium and high	0	5

**Table 4.** Types of smile fullness aspect that were given the highest scores

Types of Smile Fullness Aspect	Dental Students	Lay person
Narrow	3	6
Medium	29	10
Broad	14	17
Narrow, medium, and broad	0	16
Narrow and medium	1	0
Narrow and broad	0	0
Medium and broad	3	1

**Table 5.** Types of smile symmetry aspect that were given the highest scores

Types of Smile Symmetry Aspect	Dental Students	Lay person
Symmetrical	43	40
Asymmetrical	5	2
Symmetrical and asymmetrical	2	8

**Table 6.** Independent t-test

Aspects	Dental Students (n=50)	Lay person (n=50)	
	Mean $\pm$ SD	Mean $\pm$ SD	p
Smile arc	17.36 $\pm$ 3.61	18.66 $\pm$ 4.52	0.115
Smile line	17.86 $\pm$ 3.93	19.84 $\pm$ 3.89	0.013*
Smile fullness	18.88 $\pm$ 3.67	19.48 $\pm$ 4.79	0.484
Smile symmetry	12.14 $\pm$ 2.78	11.46 $\pm$ 3.87	0.315

## DISCUSSION

The smile arc represents the relationship of the incisal edges of the maxillary anterior teeth to the upper border of the lower lip when a person smiles. The parallel smile arc, also described as the consonant smile arc, reveals whether the curvature of the incisal edges of the maxillary anterior teeth matches that of the upper border of the lower lip, whilst a non-consonant smile arc, straight or reversed, shows that the two curvatures do not match.<sup>12</sup> Most respondents in this study, 29 dental students (58%) and 23 lay persons (46%) gave the highest scores to the straight smile arc, which is non-consonant; this indicates that the respondents preferred a straight smile arc, finding it more esthetically attractive than parallel or reversed smile arcs. This result does not correspond to the theory that consonant or parallel smile arcs are more esthetically pleasing because they give a youthful look, whereas the straight smile arc is assumed to give an older and more mature look.<sup>7,9</sup>

Education and knowledge can change people's perceptions. Dental students' perceptions of what constitutes an attractive smile may differ from those of lay persons because they have received education about the oral cavity and its esthetics.<sup>10,11</sup> This theory is in line with the results of this study, which show that there are significant differences between the perceptions of the two sample groups regarding the smile line aspect. The smile line aspect in other words, the gingival display in a smile shows the relationship of the upper lip to the appearance of the gingiva and the anterior maxillary teeth.<sup>13</sup> This result also confirms a research that has reported differences between dental practitioners and lay persons regarding their perceptions of the attractiveness of smile lines or gingival exposure.<sup>14</sup> However, most of the respondents, 33 dental students (66%) and 17 lay persons (34%) gave highest scores to the medium smile line position, indicating that they considered this the most attractive lip position. This is in line with the theory that the medium smile line position, which shows a slight gingival display, is the most esthetically pleasing and looks more attractive and youthful.<sup>13,15,16</sup>

Smile fullness plays an important role in the attractiveness of a smile and is inversely correlated with the amount of buccal corridor and negative space revealed when a person smiles.<sup>12,17</sup> Twenty nine respondents (58%) from the dental student group identified the medium smile fullness as being the most attractive; this was most likely due to the opinion that a broad smile looks less natural.<sup>18</sup> Seventeen respondents of lay persons (34%) preferred the broad smile fullness, corresponding to the existing theory that a broader smile is more attractive.<sup>8,16</sup>

Smile symmetry plays an important role in dentofacial analysis, which holds that a balanced, symmetrical smile is generally believed to be more attractive.<sup>8</sup> A majority of respondents in both groups, 43 dental students (86%) and 40 lay persons (80%) preferred the symmetrical smile. This result is also in accordance with the theory that a balanced, symmetrical smile is considered more attractive.<sup>8</sup>

The results of the independent t-test revealed a difference between the dental students and lay persons with regard to the perception of the smile line ( $p < 0.05$ ), but there were no differences in perception between the two sample groups with regard to the smile arc, smile fullness, or smile symmetry ( $p > 0.05$ ). This result confirms that most dental students and lay persons did not agree with regard to determining the most attractive lip line, but came to the same judgement on the most attractive smile arc, smile fullness, and smile symmetry. Perceptions of facial attractiveness, including a person's smile, are said to be dynamic and can change over time in line with popular trends.<sup>4,17</sup> Such perceptions are also affected by factors such as age, culture, social environment, and level of education.<sup>4</sup> These factors support the results of the data analysis, which showed that there were no significant differences in perceptions between the two groups with regard to smile arc, smile fullness, or smile symmetry.

As per the inclusion criteria, the ages of the respondents who participated in this study ranged from 20 to 25 years old. To minimize bias in evaluating smile attractiveness, all respondents also had the same cultural background and were born in Indonesia, mostly in Jakarta. Overall, the respondents all had the same level of education. The respondents were drawn from a larger population based on their very similar demographic backgrounds namely their ages, cultural and social environments, and levels of education so these factors could not have caused any significant differences in perception with regard to differences in smile attractiveness. A previous study concluded that both dental practitioners and lay persons have more similarities than differences in their major perceptions and evaluations of smile attractiveness.<sup>19</sup>

## CONCLUSION

Based on the results of this study on the differences between dental students and lay persons with regard to their perceptions of the various aspects of smile attractiveness, it can be concluded that they have differing opinions on smile lines but agree when it comes to smile arc, smile fullness, and smile symmetry.

## CONFLICT OF INTEREST

There is no conflict of interest, personal nor financial relationships toward certain individuals or organizations that could influence or cause bias in this study. The model and respondents who took part in the study have read the explanation of the study, understood the purpose of the study and agreed to participate on the study.

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## Perceptions Differences in Smile Attractiveness Between Dental Students' and Lay Persons

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Research Article

# Perceptions Differences in Smile Attractiveness Between Dental Students' and Lay Persons'

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## KEYWORDS

perception;  
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smile lines;  
smile symmetry;  
smile types

## ABSTRACT

**Introduction:** Orthodontic treatment is performed to improve dental alignment, function, oral health, dentofacial stability and to achieve better facial esthetics. People tend to seek orthodontic treatments for a more esthetically attractive smile. Several parameters are used to measure the attractiveness of smiles, including the smile arc, smile line, buccal corridor or smile type, and smile symmetry. Perceptions of the various aspects of smile attractiveness may differ among patients and dentists, so dentists must understand patients' perceptions of the aspects of smile attractiveness in order to provide satisfactory care. **Objective:** To determine if there are differences in the perceptions of dental students and lay persons regarding the aspects of smile attractiveness. **Methods:** This is an analytical observational study with a cross-sectional research design. This study was conducted by distributing questionnaires containing 11 photographs of manipulated smiles to 50 students currently training to become dental professionals and 50 lay persons. The data were analyzed using an independent t-test. **Results:** A significant difference in perception ( $p < 0.05$ ) found in the smile line parameter. However, there were no significant differences in perception ( $p > 0.05$ ) with regard to smile arc, smile type, or smile symmetry parameters. **Conclusions:** Dental students and lay persons have different perceptions regarding smile line but share the same perception of smile arc, smile types, and smile symmetry.

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## INTRODUCTION

In recent decades, knowledge of dentistry and orthodontic treatments have greatly improved among the public, which has led to an increased awareness that teeth are not only a means of chewing food but also play an important role in the appearance and esthetics of a person's face.<sup>1</sup> Most patients' motivation for seeking orthodontic treatments is to improve their facial esthetics, particularly to achieve a more attractive and beautiful smile.<sup>2-4</sup>

Smiles play a very important part in everyday life because they are a means of non-verbal communication used to show expressions and feelings.<sup>5,6</sup> An attractive smile has a positive impact on a person's social life. Smiles are divided into two classifications: the posed or social smile, which is shown while greeting someone, and the unposed or spontaneous smile, which is shown spontaneously while laughing or as a sign of pleasure.<sup>3</sup>

Dental and face esthetics can be analyzed using macro-, mini-, or micro-esthetics approaches. Macro-esthetic analysis is the examination of the face's proportions in three planes of space, while mini-esthetic analysis is the examination of the vertical relationship of the teeth to the soft tissues when a person smiles, including the smile arc, the gingival and anterior tooth display, and the amount of the dark spaces displayed between the most posterior maxillary teeth and the commissures of the lips which is known as buccal corridor.<sup>7</sup> Smile symmetry is said to be one of the components of mini-esthetics used to rate the attractiveness of a smile in a dentofacial analysis.<sup>8</sup> Finally, micro-esthetic analysis examines the appearance of the teeth with regard to tooth proportion, the correction of black triangles, problems with tooth shade and color, and the shape of the gingiva.<sup>7</sup>

There are specific characteristics in each aspect of smile attractiveness that are considered to be the most attractive.<sup>8</sup> Dentists should be cautious in determining the references they use to improve the smile esthetics of their patients, because perceptions of beauty are subjective.<sup>3,4,9</sup> A previous study revealed that there are frequent disputes between dentists and lay persons regarding dental esthetics.<sup>10</sup> These differences in perception can be affected by several factors, such as age, gender, culture, social environments, experiences and knowledge, level of education, and trends that are popularized via the media.<sup>4,10</sup> Dental students study the oral cavity as well as its esthetics. Although they interact directly with patients to apply the knowledge they have learned, their perceptions of the various aspects of smile attractiveness could differ from that of their patients.<sup>11</sup> It is an important area of research to help future dentists ensure

that they understand their patients' perceptions of what constitutes an attractive smile in order to provide satisfactory care for their patients and avoid potential legal disputes. For these reasons the author wanted to determine whether there are differences in perceptions of the various aspects of smile attractiveness between dental students and lay persons.

## MATERIALS AND METHODS

This study was approved by the Ethics Committee Faculty of Dentistry Trisakti University (ethical clearance number 398/S1/KEPK/FGK/9/2020) and conducted in the Faculty of Dentistry Trisakti University Dental Hospital. The photograph of the model whose smile was modified in this study was obtained using a Nikon Coolpix P610 DSLR (Digital Single Lens Reflex) camera (Nikon Corporation, Tokyo, Japan). The photograph was then reproduced and modified into 11 images of four different smile aspects using Adobe Creative Cloud Photoshop CC 2017 software (Adobe Inc, San Jose, CA). The four smile aspects that were evaluated are smile arc (parallel, straight, and reversed), smile line (low, medium, high), smile fullness (narrow, medium, and broad), and smile symmetry (symmetrical and asymmetrical) (Figures 1-4). These different smile images were inserted and used in the questionnaire. The respondents were asked to score each image using the Visual Analogue Scale, where 1 indicated a very unattractive smile and 10 indicated a very attractive smile. The total scores were then calculated for each smile attractiveness aspect.

The sample size calculation was done before subjects recruitment started. The sample population for this study comprised of 50 dental students enrolled at Faculty of Dentistry Trisakti University and 50 lay persons from various backgrounds (students enrolled in other faculties in Trisakti University, entrepreneurs, auditors, soldiers, teachers, musicians, photographers, engineers, lawyers, etc). The participants' ages ranged from 20 to 25 years were randomly recruited online, all subjects understand and agreed to the research informed consent by completing the Google Forms (Google LLC, Mountain View, CA).

## Statistical Analysis

The questionnaire was tested for validity and reliability using the Pearson correlation coefficient and Cronbach's alpha. After all data were collected, they were evaluated using the Kolmogorov-Smirnov test for normality. The data were found to be normally distributed, so they were analyzed using the independent t-test. All tests were done using SPSS for Windows version 23 (IBM, Armonk, NY).



**Figure 1.** Smile arc aspect



**Figure 2.** Smile line aspect



**Figure 3.** Smile fullness aspect



**Figure 4.** Smile symmetry aspect

## RESULTS

Of the 100 respondents who filled out the questionnaire, 50 respondents were dental students and 50 other lay persons. Demographic profile of the respondents can be seen in Table 1. The questionnaire validity test showed that the counted *r* values ranged from 0.591 to 0.894, while the *r* table value used was 0.04438, indicating that all of the items included in the questionnaire were valid. The Cronbach's alpha value for the questionnaire reliability test was 0.892, indicating that all of the questionnaire items were reliable.

Regarding smile arcs, fifteen dental students and eight lay persons gave the highest score to the parallel smile arc; Twenty-nine dental students and twenty-three lay persons gave the highest score to the straight smile arc; two dental students and three lay persons gave the highest score to the reversed smile arc; one dental student and eleven lay persons gave all types of smile arc the same score. One dental student and five lay persons gave the highest scores to both the parallel and straight smile arcs, and two dental students gave the highest scores to both the straight and reversed smile arcs (Table 2).

Regarding the smile line, five dental students and three lay persons gave the highest score to the low smile line position; Thirty three dental students and seventeen lay persons gave the highest score to the medium smile line position; and nine dental students and sixteen lay persons gave the highest score to the high smile line position. One dental student and seven lay persons gave all three types of smile line positions the same score; two dental students and one lay person gave the highest score to both low and medium lip line positions; one lay person gave the highest scores to both low and high smile line positions; and five lay persons gave the highest scores to both medium and high smile positions (Table 3).

In their evaluations of smile fullness, three dental students and six lay persons gave the highest score to the narrow smile; Twenty-nine dental students and ten lay persons gave the highest score to the medium smile; Fourteen dental students and seventeen lay persons gave the highest score to the broad smile. Sixteen lay persons gave all three types of smile fullness the same score. One dental student gave the highest score to both narrow and medium smiles, while three dental students and one lay person gave the highest score to both medium and broad smiles (Table 4).

Regarding smile symmetry, forty three dental students and forty lay persons gave the highest score to the symmetrical smile. Five dental students and two lay persons gave the highest score to the asymmetrical smile; while two dental students and lay persons gave the highest score to both the symmetrical and asymmetrical smiles (Table 5).

The Kolmogorov–Smirnov normality test revealed that the data for every smile attractiveness aspect were normally distributed ( $p > 0.05$ ), thus the parametric independent t-test was used for a further round of analysis. A significant difference in perception ( $p < 0.05$ ) between dental students and lay persons was found with regard to the smile line, but there were no significant differences with regard to smile arch, smile fullness, or smile asymmetry aspects between the two groups (Table 6).

The dental students gave lower average scores (mean  $\pm$  SD) to the smile arc images ( $17.36 \pm 3.61$ ) compared to the lay persons ( $18.66 \pm 4.52$ ), respectively. In assessing the smile line images, the dental students also gave a lower average score ( $17.86 \pm 3.93$ ) compared to the lay persons ( $19.84 \pm 3.89$ ). Regarding smile fullness, dental students again gave a lower average score ( $18.88 \pm 3.67$ ) compared to the lay person ( $19.48 \pm 4.79$ ). Finally, in their evaluation of smile symmetry, the dental students gave a higher average score ( $12.14 \pm 2.78$ ) compared to the lay persons ( $11.46 \pm 3.87$ ) (Table 6).

**Table 1.** Demographic profile of research respondents

	Dental Students	Lay person
Age $\pm$ SD (years)	23.08 $\pm$ 0.94	22.16 $\pm$ 1.30
Sex		
Male	17	29
Female	33	21
Profession		
Dental profession program student	50	
University student		21
Private employee		9
University fresh graduate		6
Freelancer		2
Entrepreneur		2
Information technology expert		2
Beautician		1
Auditor		1
Soldier		1
Teacher		1
Photographer		1
Musician		1
Engineer		1
Lawyer		1

**Table 2.** Types of smile arc aspect that were given the highest scores

Types of Smile Arc Aspect	Dental Students	Lay person
Parallel	15	8
Straight	29	23
Reversed	2	3
Parallel, straight, and reversed	1	11
Parallel and straight	1	5
Straight and reversed	2	0
Parallel and reversed	0	0

**Table 3.** Types of smile line aspect that were given the highest scores

Types of Smile Line Aspect	Dental Students	Lay person
Low	5	3
Medium	33	17
High	9	16
Low, medium, high	1	7
Low and medium	2	1
Low and high	0	1
Medium and high	0	5

**Table 4.** Types of smile fullness aspect that were given the highest scores

Types of Smile Fullness Aspect	Dental Students	Lay person
Narrow	3	6
Medium	29	10
Broad	14	17
Narrow, medium, and broad	0	16
Narrow and medium	1	0
Narrow and broad	0	0
Medium and broad	3	1

**Table 5.** Types of smile symmetry aspect that were given the highest scores

Types of Smile Symmetry Aspect	Dental Students	Lay person
Symmetrical	43	40
Asymmetrical	5	2
Symmetrical and asymmetrical	2	8

**Table 6.** Independent t-test

Aspects	Dental Students (n=50)	Lay person (n=50)	
	Mean $\pm$ SD	Mean $\pm$ SD	p
Smile arc	17.36 $\pm$ 3.61	18.66 $\pm$ 4.52	0.115
Smile line	17.86 $\pm$ 3.93	19.84 $\pm$ 3.89	0.013*
Smile fullness	18.88 $\pm$ 3.67	19.48 $\pm$ 4.79	0.484
Smile symmetry	12.14 $\pm$ 2.78	11.46 $\pm$ 3.87	0.315

## DISCUSSION

4 The smile arc represents the relationship of the incisal edges of the maxillary anterior teeth to the upper border of the lower lip when a person smiles. The parallel smile arc, also described as the consonant smile arc, reveals whether the curvature of the incisal edges of the maxillary anterior teeth matches that of the upper border of the lower lip, whilst a non-consonant smile arc, straight or reversed, shows that the two curvatures do not match.<sup>12</sup> Most respondents in this study, 29 dental students (58%) and 23 lay persons (46%) gave the highest scores to the straight smile arc, which is non-consonant; this indicates that the respondents preferred a straight smile arc, finding it more esthetically attractive than parallel or reversed smile arcs. This result does not correspond to the theory that consonant or parallel smile arcs are more esthetically pleasing because they give a youthful look, whereas the straight smile arc is assumed to give an older and more mature look.<sup>7,9</sup>

5 Education and knowledge can change people's perceptions. Dental students' perceptions of what constitutes an attractive smile may differ from those of lay persons because they have received education about the oral cavity and its esthetics.<sup>10,11</sup> This theory is in line with the results of this study, which show that there are significant differences between the perceptions of the two sample groups regarding the smile line aspect. The smile line aspect in other words, the gingival display in a smile shows the relationship of the upper lip to the appearance of the gingiva and the anterior maxillary teeth.<sup>13</sup> This result also confirms a research that has reported differences between dental practitioners and lay persons regarding their perceptions of the attractiveness of smile lines or gingival exposure.<sup>14</sup> However, most of the respondents, 33 dental students (66%) and 17 lay persons (34%) gave highest scores to the medium smile line position, indicating that they considered this the most attractive lip position. This is in line with the theory that the medium smile line position, which shows a slight gingival display, is the most esthetically pleasing and looks more attractive and youthful.<sup>13,15,16</sup>

Smile fullness plays an important role in the attractiveness of a smile and is inversely correlated with the amount of buccal corridor and negative space revealed when a person smiles.<sup>12,17</sup> Twenty nine respondents (58%) from the dental student group identified the medium smile fullness as being the most attractive; this was most likely due to the opinion that a broad smile looks less natural.<sup>18</sup> Seventeen respondents of lay persons (34%) preferred the broad smile fullness, corresponding to the existing theory that a broader smile is more attractive.<sup>8,16</sup>

Smile symmetry plays an important role in dentofacial analysis, which holds that a balanced, symmetrical smile is generally believed to be more attractive.<sup>8</sup> A majority of respondents in both groups, 43 dental students (86%) and 40 lay persons (80%) preferred the symmetrical smile. This result is also in accordance with the theory that a balanced, symmetrical smile is considered more attractive.<sup>8</sup>

The results of the independent t-test revealed a difference between the dental students and lay persons with regard to the perception of the smile line ( $p < 0.05$ ), but there were no differences in perception between the two sample groups with regard to the smile arc, smile fullness, or smile symmetry ( $p > 0.05$ ). This result confirms that most dental students and lay persons did not agree with regard to determining the most attractive lip line, but came to the same judgement on the most attractive smile arc, smile fullness, and smile symmetry. Perceptions of facial attractiveness, including a person's smile, are said to be dynamic and can change over time in line with popular trends.<sup>4,17</sup> Such perceptions are also affected by factors such as age, culture, social environment, and level of education.<sup>4</sup> These factors support the results of the data analysis, which showed that there were no significant differences in perceptions between the two groups with regard to smile arc, smile fullness, or smile symmetry.

As per the inclusion criteria, the ages of the respondents who participated in this study ranged from 20 to 25 years old. To minimize bias in evaluating smile attractiveness, all respondents also had the same cultural background and were born in Indonesia, mostly in Jakarta. Overall, the respondents all had the same level of education. The respondents were drawn from a larger population based on their very similar demographic backgrounds namely their ages, cultural and social environments, and levels of education so these factors could not have caused any significant differences in perception with regard to differences in smile attractiveness. A previous study concluded that both dental practitioners and lay persons have more similarities than differences in their major perceptions and evaluations of smile attractiveness.<sup>19</sup>

## CONCLUSION

Based on the results of this study on the differences between dental students and lay persons with regard to their perceptions of the various aspects of smile attractiveness, it can be concluded that they have differing opinions on smile lines but agree when it comes to smile arc, smile fullness, and smile symmetry.

## CONFLICT OF INTEREST

There is no conflict of interest, personal nor financial relationships toward certain individuals or organizations that could influence or cause bias in this study. The model and respondents who took part in the study have read the explanation of the study, understood the purpose of the study and agreed to participate on the study.

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