

Saudi Children's and Their Parents' Perception of a Digitally Modified Photograph Model of Different Smiles with Different Anterior Teeth Alignments and Dental Appearances

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ABSTRACT

Aim: Since there is a lack of data on dentofacial esthetic perception in Saudi Arabia, the present research was conducted to study children's and their parent's perceptions of smiles with different dental alignments and dental appearances. In addition, we aimed to determine whether facial attractiveness or dental esthetic dominates the overall esthetic perception. Finally, we aimed to investigate the influence of gender on the judgment of a dental smile.

Materials and methods: Six digitally altered photographs and two dynamic videos of smiling faces of boys and girls with different dental alignments and appearances were shown to 183 children and their parents in malls in Saudi Arabia's Qassim Province. Following the parent's acceptance of the interview, the child was interviewed first, followed by the parent. Their responses were measured using a smile perception questionnaire (SPQ) for children aged 8–10 years. Data were analyzed using the Kruskal–Wallis one-way analysis of variance (ANOVA) and the Wilcoxon signed-rank test.

Results: The results demonstrated that whole-face smiles of both boys and girls with different poor dentofacial esthetics had a significantly lower rating score than lower third-face smiles scores among children and their parents ($p \leq 0.05$). Except for a few views, there were no significant differences between children's and their parents' dentofacial esthetic judgments. Moreover, the answers to the smile perception questionnaire 8–10 for the smiling face dynamic videos of boys and girls were not significantly different.

Conclusion: Children agreed with their parents in judging the smiles of different dentofacial esthetic perceptions. Overall, esthetics was more influenced by facial esthetics than dental esthetics. Background attractiveness and sexual characteristics do not affect smile perception.

Clinical significance: The smile is considered one of the major determinants of how the overall esthetic of children will appear. Thus, the comprehensive diagnosis involving the analysis of malocclusion and poor dental appearance psychological effect can be used for patient care improvement. Consequently, dental treatment to improve the dental smile will enhance the children's quality of life and social interaction.

Keywords: Dentofacial esthetic, Digitally modified photograph, Perception, Saudi children, Smiling face.

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INTRODUCTION

Facial appearance and physical attractiveness are critical components of social interaction, despite current social norms discouraging the judgment of people based on their appearance.^{1,2} Therefore, facial attractiveness and esthetics play a significant role in the developmental stages of a person's personal and social life.³ In individuals, dental appearance is considered a significant determinant of beauty.^{4–6} Dental appearance includes the color, size, shape, position, and alignment of the teeth. Therefore, any problem in the aforementioned characteristics might affect the entire dentofacial esthetic.^{7–10} However, it appears that young ages, including children and adolescents, were most affected by problems in dentofacial appearance, followed by adults.^{11–14}

Many studies have examined the influence of dentofacial appearance on children's social reactions, particularly the smile effect.^{13,15} These studies discussed many issues, including the sequela of a dentofacial impression on social responses, the difference in perception between children and their parents, and demographic differences in perception (such as age, race, ethnicity, and gender). Verdecchia et al. investigated the impact of anterior dental alignment in 8–10-year-old children on the first impression of their peers using digitally altered full frontal photographs

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measured by a smile perception questionnaire for children between the ages of 8 and 10 years (SPQ 8–10).¹⁶ Children reacted favorably to the photographs of well-aligned teeth. Furthermore, Lombardo et al. investigated the effect of dental alignment and dental smile perception among 180 children aged 8–10 years and

their parents using digitally altered photographs, videos, and SPQ 8–10 questionnaires. There were no significant differences in perception and sensation for different dental alignments between the children and their parents. However, background facial attractiveness and general traits affect the judgment of smiles.¹⁷ Many studies agree with these studies regarding the impact of malocclusion on children's perceptions at different social levels and parents' concerns about their children's appearance.^{12,18,19}

Recently, research groups led by Tiro applied the same concept to 157 children and their parents using six dentofacial appearance color photos with a six-grade acceptance scale. The results showed dentofacial esthetic concerns among the children and their parents, but the level of perception increased with age.²⁰ To date, no study has described the perception of dentofacial esthetics in children and their parents in Saudi Arabia. Thus, this study was conducted to identify children's and their parents' perceptions of different dental alignments and appearances. Moreover, we compared the effects of a whole-face smile and a lower-third-face smile. Finally, we aimed to understand the influence of gender on the judgment of a dental smile.

MATERIALS AND METHODS

Study Design

A cross-sectional study was used to collect the participant information for this study. The study agreed with the standards of the World Medical Association Declaration of Helsinki. The Dental Ethics Committee approved this study of the Dental Research Centre (DRC), Qassim University (EA/M-2020-3017, 25/4/2020).

Setting and Participants

The sample included 183 children and their parents, randomly collected from families who visited different commercial malls in Al-Qassim Province. This setting was used after receiving acceptance from the mall authorities. In the mall's main hall, families were introduced to the research concept and their acceptance to participate in the study and written informed consent was obtained. They were then invited to a prepared location on one side of the main hall to conduct the meeting. All children in this study were Saudis, 8–10 years old, physically and mentally fit, and capable of speaking and comprehending the Arabic language. Children who did not fulfill these study inclusion criteria were excluded.

Data Sources/Measurement

The photographs used in this questionnaire were obtained from Saudi children. However, some edited teeth alignment photos were obtained from a previous study.¹⁷ Two photographs of one boy and one girl were digitally modified by a designer using the Adobe Photoshop Program (Access 2020, Adobe Photoshop CC 21.0.1, Adobe Systems Inc., San Francisco, California, USA) to include the following anterior teeth alignment and appearances: Good anterior dental alignment (GA), median diastema (MD), protrusion of the maxillary incisors (PI), incisor crowding (IC), anterior teeth caries (DC), and incisor discoloration (ID).

A smile perception questionnaire for children between the ages of 8 and 10 years (SPQ 8–10) was used to measure the children's responses, not the parents. The questionnaire consisted of 15 direct questions related to five areas of interest: Pleasantness/unpleasantness, honesty and altruism/dishonesty and selfishness, extroversion/introversion, personal experience, intelligence, and respect. Questions 1, 5, and 8 dealt with pleasantness/

unpleasantness, while questions 2, 4, and 6 dealt with honesty and altruism/dishonesty and selfishness. Furthermore, questions 3, 7, and 12 covered the extroversion/introversion category. Questions 9, 10, and 13 were related to the personal experience category, while the intelligence and respect category contained questions 11, 14, and 15. In this questionnaire, child preference was determined using a score from 1 to 5, in which one means not at all, while five means a lot.¹⁶ The SPQ 8–10 was translated into Arabic and assessed by a language expert to ensure that the Arabic questionnaire version was identical to the English version. The validity and reliability of the questionnaire were confirmed in a small pilot study.

The same interviewer (MAA) conducted all the interviews. The questionnaire consisted of three parts. In part one, children were individually shown all digitally modified photographs of the lower third faces of smiling boys, followed by those of smiling girls, away from their parents. Their parents were then interviewed (Figs 1 and 2). The children and their parents rated each photograph from 0 to 10, where 0 indicated the most unacceptable appearance and 10 indicated the most acceptable appearance.

In part two, the same procedure was followed; however, digitally modified photographs containing the entire face of smiling boys and girls were shown (Figs 3 and 4). They were also rated from 0 to 10 by the children and their parents. Finally, a dynamic video with digitally altered photographs of the entire face of smiling boys was successively shown to the children (<https://drive.google.com/file/d/13CYc6ySYL30RyGCsm1BLuLMW3EyxOESK/view>). Then, they were asked to pause the video and individually fill out the SPQ 8–10 for the paused picture without their parents' participation. Another video of the entire face of smiling girls was shown to the children and asked them to fill out the SPQ 8–10 in the same way (<https://drive.google.com/file/d/1sOwHSXtk8c7h2Dq0hIZyIRI5m0iSHFFg/view>).

Study Size

The sample size was calculated using G power software (<http://www.gpower.hhu.de/en.html>). Considering the power of previously published articles (16, 17) and our study's expected power (0.80) and confidence interval of 95%, we took the lowest prevalence to determine the sample size; the sample was 123 participants with an effect size of 0.402.

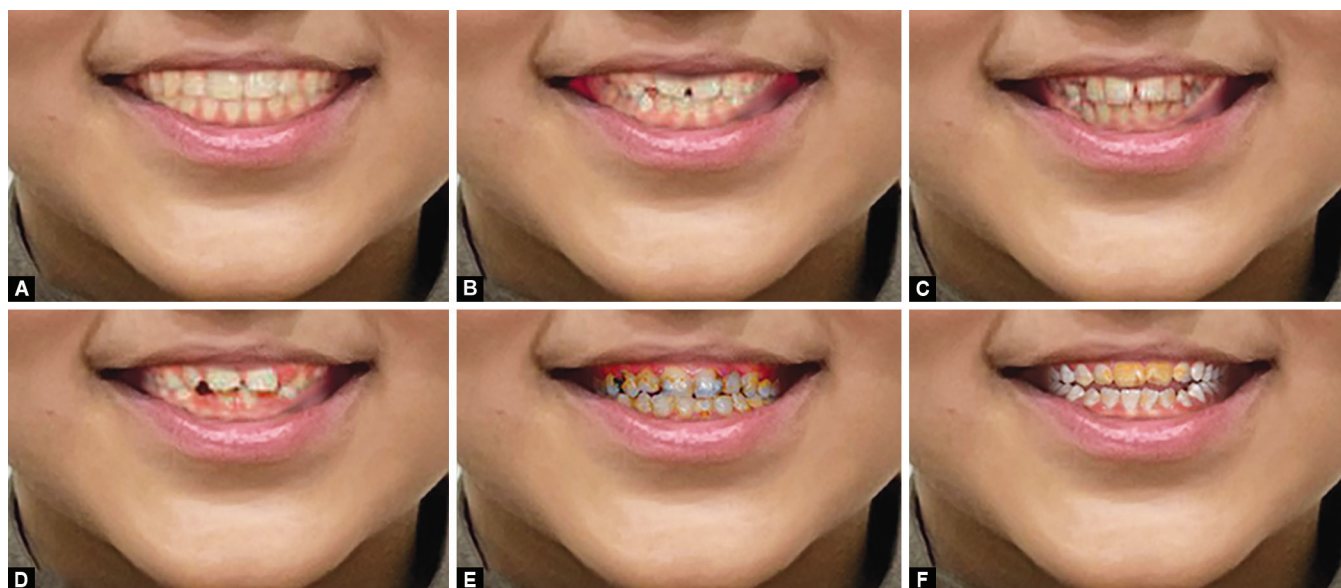
Statistical Methods

Statistical analyses were performed using SPSS version 23. Since the collected data were ordinal, they were analyzed using nonparametric methods. The Kruskal–Wallis one-way analysis of variance (ANOVA) test was applied to compare responses for each question of the SPQ 8–10 while the Mann–Whitney *U*-test was applied to compare boy's and girl's smiling faces videos. The Wilcoxon signed-rank test was used to compare children's and their parent's responses to the full-face smile and those to the lower third of the face. (*p*-value that was considered statistically significant when $p \leq 0.05$).

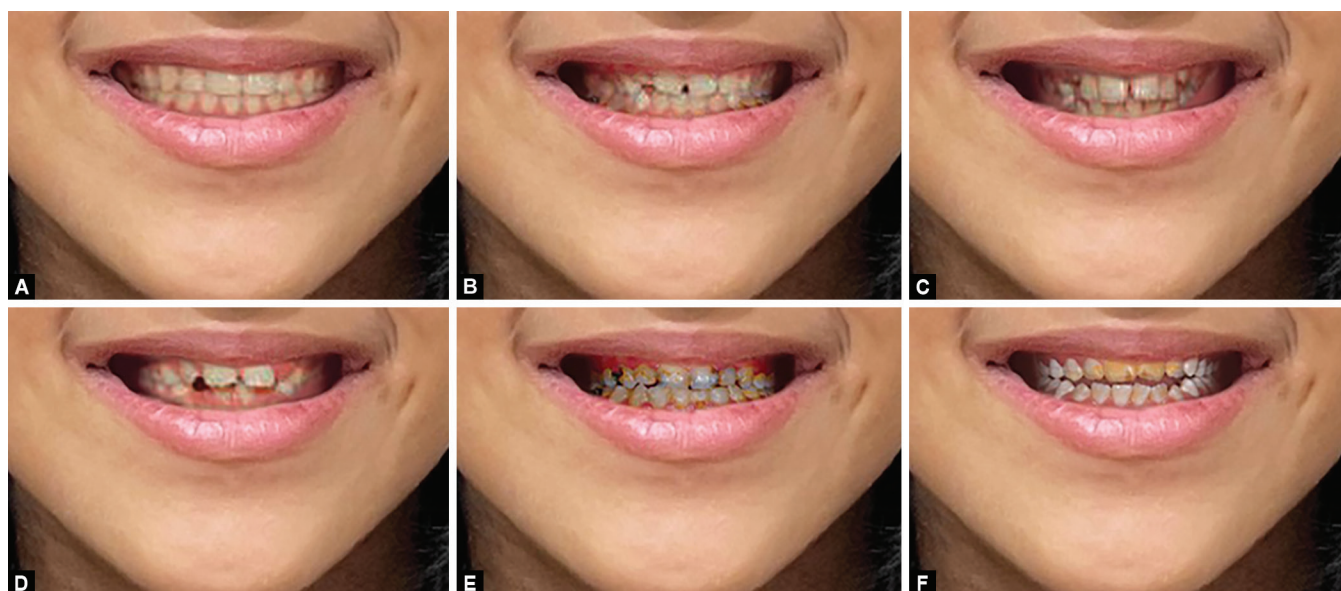
RESULTS

Participants

In total, 256 families were evaluated for eligibility and acceptance for the study. Among them, 52 refused to participate and 21 were excluded because they were under the predetermined age limit (8–10 years). This study included 183 children and their parents who were recruited from July 2020 to February 2021.



Figs 1A to F: Photographs of the digitally modified lower third part of the smiling face of a boy with different anterior dental alignments and dental appearances. (A) Good anterior dental alignment; (B) Median diastema; (C) Incisor crowding; (D) Protrusion of the maxillary incisors; (E) Anterior teeth caries; (F) Incisor discoloration



Figs 2A to F: Photographs of the digitally modified lower third part of the smiling face photographs of a girl with different anterior dental alignments and dental appearances. (A) Good anterior dental alignment; (B) Median diastema; (C) Incisor crowding; (D) Protrusion of the maxillary incisors; (E) Anterior teeth caries; (F) Incisor discoloration

Descriptive Data

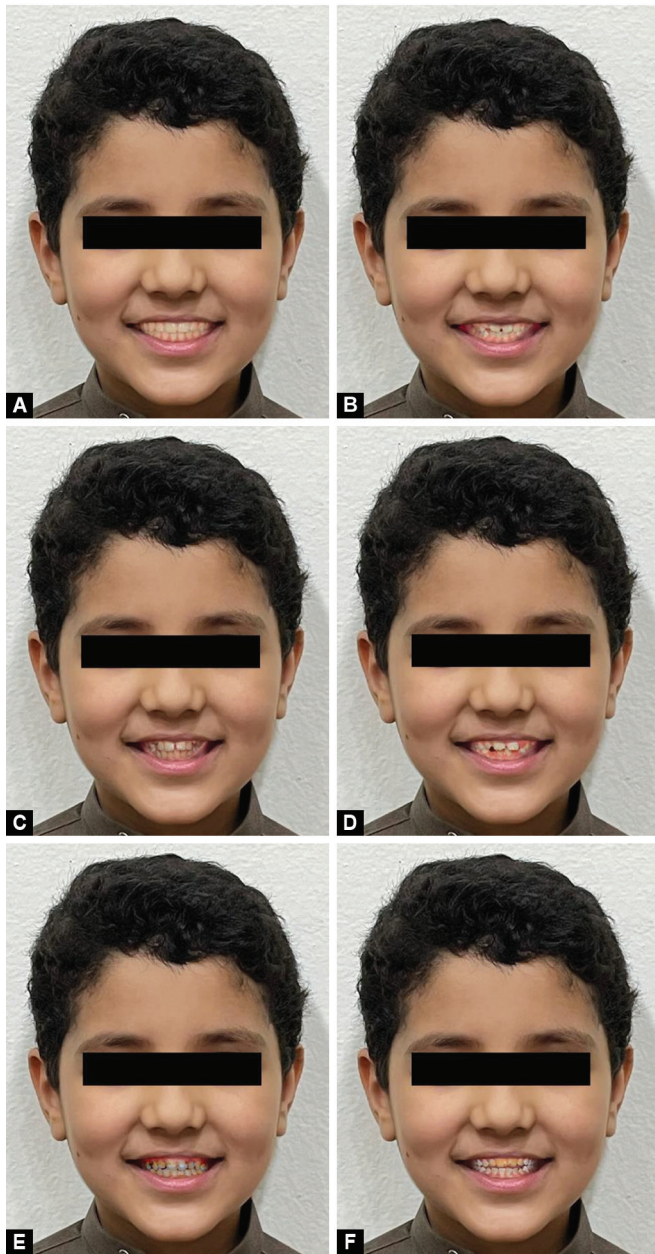
The response rate for this study was 77.8%. The boys represent 55.7%, while the girls represent 44.2% of the included sample in this study. Furthermore, the mean age was 9.12 ± 0.718 years. The highest scores (10) in the digitally modified photograph questionnaire were given for GA with the lower third-face smile (girl) and GA with a whole-face smile (girl) (62.8% and 66.1%, respectively).

Main Results

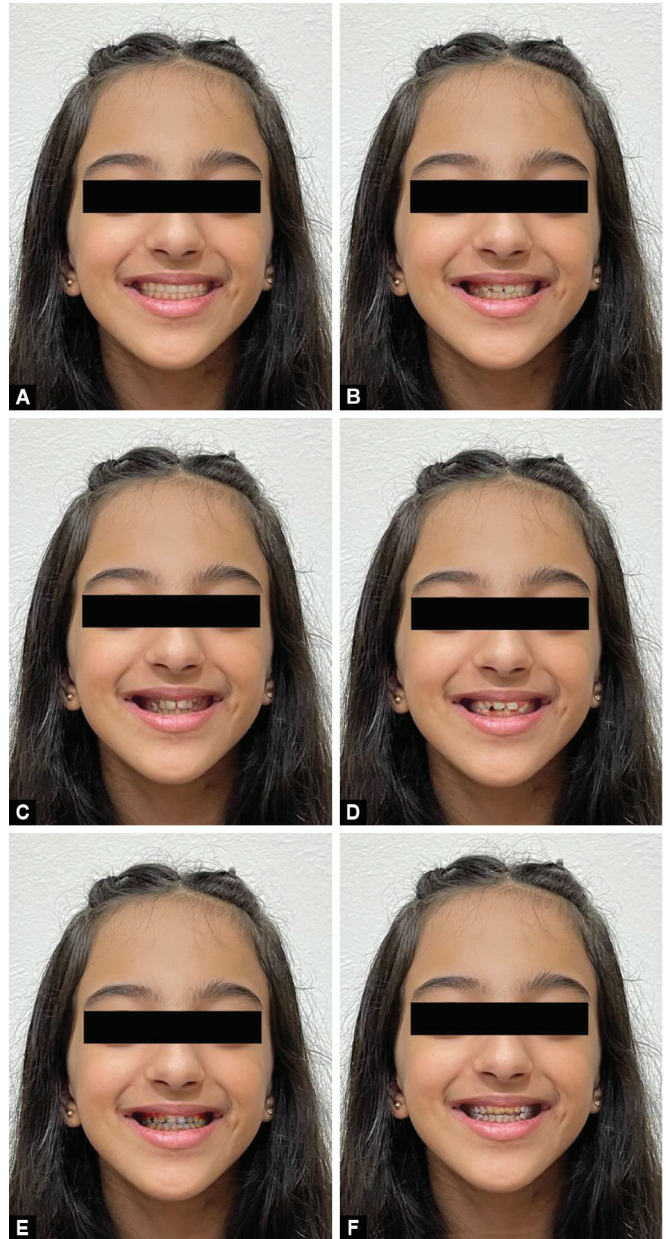
In [Table 1](#), the Wilcoxon test was applied to compare the whole smiling faces and lower third smiling faces for both boys and girls, based on children's and parents' judgments (scores ranged from 1 to 10).

The whole smiling face of the smiling face with different dental alignments and appearances in boys and girls had a significantly higher mean score than the lower third face ($p \leq 0.001$). However, there was no significant mean score difference in GA between the whole and lower-third smiling faces, although there was a higher significant difference in the girl's entire face than the girl's lower-third face for the children's judgment only (Mean 9.01, $p \leq 0.009$).

[Table 2](#) shows the judgment results of scoring by children for smiling face videos for both lower third and whole-face smiles. There was no significant difference among the first four SPQ 8–10 questions in both boy's and girl's smiling dynamic videos. In question number 5, "Do you think he/she is an unpleasant child?", there was



Figs 3A to F: Photographs of the digitally modified entire smiling face of a boy with different anterior dental alignments and dental appearances. (A) Good anterior dental alignment; (B) Median diastema; (C) Incisor crowding; (D) Protrusion of the maxillary incisors; (E) Anterior teeth caries; (F) Incisor discoloration



Figs 4A to F: Photographs of the digitally modified entire smiling face of a girl with different anterior dental alignments and dental appearances. (A) Good anterior dental alignment; (B) Median diastema; (C) Incisor crowding; (D) Protrusion of the maxillary incisors; (E) Anterior teeth caries; (F) Incisor discoloration

a significant difference in the mean on the boy smiling dynamic video (Mean 2.56, $p \leq 0.008$). In contrast, there was no significant difference in the girl's smiling dynamic video. Furthermore, there was a significant mean judgment difference in questions 12 and 14 in both boys' and girls' smiling dynamic videos: "Would you say he/she is unhappy?" and "Do you think he/she often gets angry?" (Mean 2.28, 2.26, $p \leq 0.040, 0.030$, respectively). On the other hand, there was no significant difference among the mean judgment in the rest of SPQ 8–10 questions. Moreover, there was no statistical difference in the answers between the boy's and girl's smiling dynamic videos.

Table 3 shows the comparison between the children's and parents' judgments (scores ranged from 1 to 10) on the whole and

the lower third part of the smiling faces of boys and girls. There was no significant difference between parent's and children's judgment. However, for the following views, the mean scores given by children were significantly higher than those given by parents: DC in a girl, PI in a girl, IC in a boy, IC in a girl, and MD in a girl (Mean 2.54, $p \leq 0.020$, Mean 3.88, $p \leq 0.010$, Mean 3.54, $p \leq 0.020$, mean 3.87, $p \leq 0.010$, and mean 5.19, $p \leq 0.01$, respectively).

DISCUSSION

Facial esthetics have a tremendous psychological impact on the quality of life of both adults and children. An esthetic smile is

Table 1: Comparison between the entire face smiling views and the lower third part of the smiling face views among boy's and girl's faces

Variable	Children judgment			Parent judgment		
	Mean (SD)	Median (min – max)	Z test (p-value)	Mean (SD)	Median (min – max)	Z test (p-value)
GA boy's entire face	8.52 (2.17)	10.00 (1.00–10.00)	1.099	8.04 (2.73)	9.00 (1.00–10.00)	0.204
GA boy's lower 1/3 face	8.30 (2.67)	10.0 (1.00–10.00)	(0.272)	8.12 (2.61)	9.00 (1.00–10.00)	(0.838)
GA girl's entire face	9.01 (2.02)	10.00 (1.00–10.00)	2.614	8.74 (2.47)	10.00 (1.00–10.00)	-1.273
GA girl's lower 1/3 face	8.63 (2.54)	10.00 (1.00–10.00)	(0.009*)	8.66 (2.54)	10.00 (1.00–10.00)	(0.203)
DC boy's entire face	3.42 (2.36)	3.00 (1.00–10.00)	6.323	3.13 (2.29)	3.00 (1.00–10.00)	5.586
DC boy's lower 1/3 face	2.48 (2.03)	2.00 (1.00–10.00)	(<0.0001*)	2.30 (2.31)	1.00 (1.00–10.00)	(<0.0001*)
DC girl's entire face	3.53 (2.60)	3.00 (1.00–10.00)	5.182	3.11 (2.24)	2.00 (1.00–10.00)	6.154
DC girl's lower 1/3 face	2.54 (1.95)	2.00 (1.00–10.00)	(<0.0001*)	2.15 (1.97)	1.00 (1.00–10.00)	(<0.0001*)
PI boy's entire face	4.63 (2.73)	4.00 (1.00–10.00)	6.000	4.09 (2.62)	4.00 (1.00–1.00)	3.573
PI boy's lower 1/3 face	3.67 (2.44)	3.00 (1.00–10.00)	(<0.0001*)	3.34 (2.31)	3.00 (1.00–9.000)	(<0.0001*)
PI girl's entire face	3.88 (2.44)	3.00 (1.00–10.00)	4.596	3.27 (2.04)	3.00 (1.00–9.00)	2.177
PI girl's lower 1/3 face	3.16 (2.17)	3.00 (1.00–10.00)	(<0.0001*)	2.96 (2.02)	2.00 (1.00–10.00)	(0.030*)
IC boy's entire face	3.54 (2.33)	3.00 (1.00–10.00)	5.453	3.00 (2.07)	3.00 (1.00–8.00)	3.604
IC boy's lower 1/3 face	2.78 (2.24)	2.00 (1.00–10.00)	(<0.0001*)	2.62 (2.17)	2.00 (1.00–10.00)	(<0.0001*)
IC girl's entire face	3.87 (2.35)	4.00 (1.00–10.00)	6.793	3.25 (2.00)	3.00 (1.00–8.00)	3.332
IC girl's lower 1/3 face	2.81 (2.08)	2.00 (1.00–10.00)	(<0.0001*)	2.85 (2.18)	2.00 (1.00–10.00)	(0.001*)
MD boy's entire face	5.42 (2.90)	5.00 (1.00–10.00)	7.581	4.92 (2.92)	5.00 (1.00–10.00)	5.693
MD boy's lower 1/3 face	4.08 (2.55)	4.00 (1.00–10.00)	(<0.0001*)	3.83 (2.42)	3.00 (1.00–10.00)	(<0.0001*)
MD girl's entire face	5.19 (2.94)	5.00 91.00–10.000	6.430	4.40 (2.63)	4.00 (1.00–10.00)	4.344
MD girl's lower 1/3 face	3.95 (2.49)	4.00 (1.00–10.00)	(<0.0001*)	3.50 (2.18)	3.00 (1.00–9.00)	(<0.0001*)
ID boy's entire face	3.40 (2.48)	3.00 (1.00–10.00)	5.682	3.05 (1.95)	3.00 (1.00–9.00)	3.226
ID boy's lower 1/3 face	2.74 (1.93)	2.00 (1.00–10.00)	(<0.0001*)	2.67 (1.99)	2.00 (1.00–10.00)	(0.001*)
ID girl's entire face	4.48 (2.79)	5.00 (1.00–10.00)	6.220	4.05 (2.53)	4.00 (1.00–10.00)	4.216
ID girl's lower 1/3 face	3.49 (2.26)	3.00 (1.00–10.00)	(<0.0001*)	3.36 (2.22)	3.00 (1.00–9.00)	(<0.0001*)

Wilcoxon test was applied to the children's and parents' judgments (from 1 to 10) DC, dental caries; GA, good alignment; IC, incisal crowding; ID, incisal discoloration; MD, median diastema; PI, protruding incisors *Statistically significant at $p \leq 0.05$

considered one of the cornerstones of overall esthetics.²¹ There is a lack of research on this subject worldwide, and there has been no similar research performed in Saudi Arabia.¹³ Therefore, this study was conducted to assess children's and their parents' esthetic perceptions of smiles. The age of the children ranged from 8 to 10 years, which is a common age for interceptive orthodontic treatment, and generally, the upper anterior teeth tend to be completed at this age.¹⁶ The digitally modified photograph used was of a Saudi boy and girl to ensure ethnic homogeneity. The study was conducted in malls, which are a good source to find parents and their children, since it is challenging to bring parents to school, especially during work hours. Furthermore, children tend to be happy when they are at a mall and may therefore be more eager to participate than when they are at a dental clinic. The interviews were conducted with the children without their parents first, and the parents were interviewed later to avoid their influence on the children's judgment. The SPQ 8–10 questionnaire was used to evaluate the children's responses to the dynamic video of different digitally altered photographs of the whole face of smiling boys and girls. It was validated by Verdecchia et al. in 2011 and has been used by other researchers in their studies.^{16,17,22} It is suitable and convenient for children aged 8–10 years old, the target group in our study.

In the present study, the digitally altered photographs of dental malalignment and poor dental appearance of the entire smiling face

had the highest mean scores compared to those of the lower third smiling face among children and their parents (Table 1). This means that children and their parents could neither recognize nor sense the effects of dental problems on esthetic appearance. Consequently, the children's and their parents' perceptions of photographs of the lower third of smiling faces were lower than those of the full-smiling face. Only the results for photos of boys agreed with those of the study by Lombardo et al.,¹⁷ while there was no difference in the photos of girls, except in the IC. However, the results of our static photo scores did not agree with the dynamic photo score results of the second study conducted by Lombardo et al.²² The second study indicated that the perception was the same regarding the smile, whether presented on the whole face or the lower third face. Possibly, this is due to the fact that children viewed videos that simultaneously demonstrated four different alignments, thereby influencing the interviewer's judgments. Thus, our research results indicated that facial attractiveness affected overall esthetic more than dental esthetics, which corroborated the results of previous studies.^{13,23}

Furthermore, this study showed no difference in the perception of the GA smile photograph, for both full and partial-face smile photographs (Table 1). Thus, an excellent dental aesthetic complements the perception of facial attractiveness. Moreover, many researchers found no significant effect of gender on children's and their parents' judgment of the presented photographs,

Table 2: Comparison between the judgments given by children among boy's and girl's smiling faces videos for both views

	Boys smiling dynamic video			Girls smiling dynamic video			U test (p-value)
	Mean (SD)	Median (min – max)	χ^2 test (p-value)	Mean (SD)	Median (min – max)	χ^2 test (p-value)	
1. Does he/she look friendly to you?	3.70 (1.47)	4.00 (1.00–5.00)	0.140 (0.705)	3.93 (1.40)	5.00 (1.00–5.00)	0.420 (0.520)	1.484 (0.138)
2. Does he/she like an honest child?	3.75 (1.42)	4.00 (1.00–5.00)	0.830 (0.364)	3.94 (1.29)	4.00 (1.00–5.00)	0.170 (0.683)	1.090 (0.276)
3. Do you think he/she has a lot of friends?	3.64 (1.31)	4.00 (1.00–5.00)	3.300 (0.069)	3.72 (1.34)	4.00 (1.00–5.00)	0.000 (0.989)	0.770 (0.441)
4. Do you think he/she is a polite child?	3.70 (1.38)	4.00 (1.00–5.00)	0.130 (0.721)	3.95 (1.31)	5.00 (1.00–5.00)	0.450 (0.504)	1.824 (0.068)
5. Do you think he/she is an unpleasant child?	2.56 (1.41)	2.00 (1.00–5.00)	7.130 (0.008*)	2.38 (1.32)	2.00 (1.00–5.00)	1.00 (0.318)	1.187 (0.235)
6. Would you say he/she is willing to lend his/her drawing pens?	3.50 (1.34)	4.00 (1.00–5.00)	0.030 (0.863)	3.62 (1.31)	4.00 (1.00–5.00)	0.010 (0.752)	0.866 (0.387)
7. Do you believe he/she likes spending time by him/herself?	2.55 (1.37)	3.00 (1.00–5.00)	2.750 (0.097)	2.63 (1.44)	3.00 (1.00–5.00)	1.450 (0.229)	0.500 (0.617)
8. Does he/she seem like a child who likes telling jokes?	3.40 (1.40)	4.00 (1.00–5.00)	2.220 (0.136)	3.37 (1.32)	3.00 (1.00–5.00)	0.000 (0.955)	0.457 (0.648)
9. Would you say he/she is a happy child?	3.84 (1.31)	4.00 (1.00–5.00)	0.770 (0.379)	3.79 (1.34)	4.00 (1.00–5.00)	0.490 (0.482)	0.283 (0.777)
10. Do you think he/she gets good marks at school?	3.62 (1.32)	4.00 (1.00–5.00)	0.020 (0.881)	3.83 (1.31)	4.00 (1.00–5.00)	2.00 (0.158)	1.732 (0.083)
11. Do you think he/she is talkative?	3.70 (1.27)	4.00 (1.00–5.00)	1.240 (0.265)	3.62 (1.29)	4.00 (1.00–5.00)	0.230 (0.635)	0.631 (0.528)
12. Would you say he/she is unhappy?	2.28 (1.38)	2.00 (1.00–5.00)	3.930 (0.040*)	2.26 (1.42)	2.00 (1.00–5.00)	4.560 (0.030*)	0.220 (0.826)
13. Do you think he/she is respected?	3.86 (1.29)	4.00 (1.00–5.00)	2.040 (0.154)	3.77 (1.27)	4.00 (1.00–5.00)	1.030 (0.311)	0.926 (0.355)
14. Do you think he/she often gets angry?	2.74 (1.29)	3.00 (1.00–5.00)	7.880 (0.005*)	2.75 (1.37)	3.00 (1.00–5.00)	4.960 (0.021*)	0.032 (0.975)
15. Do you think that he/she is teased by classmates?	2.75 (1.46)	3.00 (1.00–5.00)	0.210 (0.646)	2.69 (1.53)	3.00 (1.00–5.00)	1.010 (0.316)	0.437 (0.662)

*Statistically significant difference at p-value ≤ 0.05, χ^2 test: Kruskal–Wallis test, U test: Mann–Whitney U test

these results agreed with those of the aforementioned studies (Table 1).^{12,22} Nevertheless, the results of some researchers (Shaw and Lombardo) disagreed with our results, which found that gender had a significant effect on children's and parents' judgments.^{5,17} However, the age group in the study by Shaw et al. (11–13 years) was higher than that in our study, which might lead to a difference in the results.⁵ Although our age groups were the same as those in the study by Lombardo et al.,¹⁷ they used a smiling video instead of smiling photos, which means that children's perception of dynamic videos was affected by gender more than that in static photos.

In the present study, After comparing the dynamic smiling videos of boys and girls (Table 2), the current research indicated that almost the same response was found. Despite this, a few questions showed that a smiling video received higher mean scores for honesty, extroversion, intelligence, and respect (questions 4, 12, and 14). These results support the idea that a child of 8–10 years with a pleasant smile is considered a person with a positive attitude and qualities such as righteousness, accuracy, and intelligence. This observation is consistent with those of previous studies.^{5,16} However, these results were not agreed with those of the first study by Lombardo et al.¹⁷ regarding the gender-related difference in the perception of dynamic videos and static photos. This result is more convenient due to the age of the children (8–10 years); based on

that, younger children are usually less influenced by their gender background.

Consistent with previous studies, our results demonstrated that children and their parents had almost the same judgment regarding the dentofacial esthetic perception of digitally modified photographs of dental alignment and dental appearances (Table 3).^{17,18,20,24} However, the scores given by parents were significantly higher than those given by children (IC in a girls, PI in a girl, IC in a boy, IC in a girl, and MD in girls). It seems that girls' photos were less affected by background attractiveness than boys' photos (gender effect); this is also compatible with the results of the first study by Lombardo et al.¹⁷ Conversely, IC in boys and girls might be more attractive to parents than to children.

To our knowledge, this is the first study to assess the perception of dentofacial esthetics among children and their parents in Saudi Arabia. However, this study has some limitations. First, the digitally modified photograph consisted of only two smiling children with broad smiles but did not emphasize different types of smiles, such as narrow ones. Second, since the study was cross-sectional, only the first opinion was evaluated, and there was no chance of a subsequent reaction. Finally, the study covered only Qassim Province, which represents the kingdom's central region. Hence, further investigations are needed to cover different areas of Saudi

Table 3: Comparison between the children and parent's judgments for both views of the entire face smiling and the lower third part of the smiling face among boy's and girl's faces

Variable	Children judgment		Parent judgment		Z test (p-value)
	Mean (SD)	Median (min – max)	Mean (SD)	Median (min – max)	
GA boy's entire face	8.52 (2.17)	10.00 (1.00–10.00)	8.04 (2.73)	9.00 (1.00–10.00)	1.793 (0.073)
GA boy's lower 1/3 face	8.30 (2.67)	10.0 (1.00–10.00)	8.12 (2.61)	9.00 (1.00–10.00)	0.746 (0.455)
GA girl's entire face	9.01 (2.02)	10.00 (1.00–10.00)	8.74 (2.47)	10.00 (1.00–10.00)	0.916 (0.360)
GA girl's lower 1/3 face	8.63 (2.54)	10.00 (1.00–10.00)	8.66 (2.54)	10.00 (1.00–10.00)	0.152 (0.879)
DC boy's entire face	3.42 (2.36)	3.00 (1.00–10.00)	3.13 (2.29)	3.00 (1.00–10.00)	1.285 (0.199)
DC boy's lower 1/3 face	2.48 (2.03)	2.00 (1.00–10.00)	2.30 (2.31)	1.00 (1.00–10.00)	1.401 (0.161)
DC girl's entire face	3.53 (2.60)	3.00 (1.00–10.00)	3.11 (2.24)	2.00 (1.00–10.00)	1.387 (0.166)
DC girl's lower 1/3 face	2.54 (1.95)	2.00 (1.00–10.00)	2.15 (1.97)	1.00 (1.00–10.00)	2.286 (0.020*)
PI boy's entire face	4.63 (2.73)	4.00 (1.00–10.00)	4.09 (2.62)	4.00 (1.00–1.00)	1.835 (0.067)
PI boy's lower 1/3 face	3.67 (2.44)	3.00 (1.00–10.00)	3.34 (2.31)	3.00 (1.00–9.000)	1.236 (0.217)
PI girl's entire face	3.88 (2.44)	3.00 (1.00–10.00)	3.27 (2.04)	3.00 (1.00–9.00)	2.390 (0.010*)
PI girl's lower 1/3 face	3.16 (2.17)	3.00 (1.00–10.00)	2.96 (2.02)	2.00 (1.00–10.00)	0.820 (0.412)
IC boy's entire face	3.54 (2.33)	3.00 (1.00–10.00)	3.00 (2.07)	3.00 (1.00–8.00)	2.308 (0.020*)
IC boy's lower 1/3 face	2.78 (2.24)	2.00 (1.00–10.00)	2.62 (2.17)	2.00 (1.00–10.00)	0.736 (0.462)
IC girl's entire face	3.87 (2.35)	4.00 (1.00–10.00)	3.25 (2.00)	3.00 (1.00–8.00)	2.569 (0.010*)
IC girl's lower 1/3 face	2.81 (2.08)	2.00 (1.00–10.00)	2.85 (2.18)	2.00 (1.00–10.00)	0.093 (0.926)
MD boy's entire face	5.42 (2.90)	5.00 (1.00–10.00)	4.92 (2.92)	5.00 (1.00–10.00)	1.685 (0.092)
MD boy's lower 1/3 face	4.08 (2.55)	4.00 (1.00–10.00)	3.83 (2.42)	3.00 (1.00–10.00)	0.862 (0.389)
MD girl's entire face	5.19 (2.94)	5.00 91.00–10.000	4.40 (2.63)	4.00 (1.00–10.00)	2.534 (0.01*)
MD girl's lower 1/3 face	3.95 (2.49)	4.00 (1.00–10.00)	3.50 (2.18)	3.00 (1.00–9.00)	1.672 (0.094)
ID boy's entire face	3.40 (2.48)	3.00 (1.00–10.00)	3.05 (1.95)	3.00 (1.00–9.00)	1.194 (0.233)
ID boy's lower 1/3 face	2.74 (1.93)	2.00 (1.00–10.00)	2.67 (1.99)	2.00 (1.00–10.00)	0.428 (0.669)
ID girl's entire face	4.48 (2.79)	5.00 (1.00–10.00)	4.05 (2.53)	4.00 (1.00–10.00)	1.403 (0.161)
ID girl's lower 1/3 face	3.49 (2.26)	3.00 (1.00–10.00)	3.36 (2.22)	3.00 (1.00–9.00)	0.475 (0.634)

Wilcoxon test was applied to the children's and parents' judgments (from 1 to 10) DC, dental caries; GA, good alignment; IC, incisal crowding; ID, incisal discoloration; MD, median diastema; PI, protruding incisors *Statistically significant at $p \leq 0.05$

Arabia, considering previous limitations. This study emphasizes the importance of a smile on the overall esthetic of children. Therefore, the analysis of the psychological effects of malocclusion and poor

dental appearance during the diagnosis procedure should be considered. Thus, improving the dental smile will enhance the children's quality of life and social interaction.

CONCLUSION

We can conclude that there was no difference in judgment between children and their parents regarding the perception of the variety of teeth alignments and dental appearances. However, the entire face is a more definitive factor than dental esthetics in overall esthetic perception, especially when there is an esthetic problem. Perfect dental esthetic, however, still enhances facial attractiveness. Furthermore, gender did not affect the children's and their parent's dentofacial esthetic perception. Children aged 8–10 years tend to have positive personalities and therefore perceive honesty, extraversion, and intelligence when dealing with different types of dentofacial esthetics.

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CONSENT

All participating parents provided written informed consent for the participation and publication of the manuscript. The study used modified photos taken from the author's relative children after obtaining permission from their parents to be published.

AUTHORS CONTRIBUTIONS

MAA: Methodology, investigation, data curation, and manuscript drafting. TAA: Conceptualization, supervision, validation, writing—original draft preparation, review, and editing. All authors critically reviewed and approved the final draft and were responsible for the content and similarity index of the manuscript.

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