# **Original Article**

# Influence of aging on facial attractiveness perception in individuals with normal occlusion

# Gabriela Natsumeda<sup>a</sup>; Ivan Silva<sup>b</sup>; Felicia Miranda<sup>c</sup>; Camila Massaro<sup>d</sup>; Daniela Garib<sup>e</sup>

# ABSTRACT

**Objectives:** To evaluate the perception of orthodontists and laypeople of facial attractiveness during aging in participants with acceptable, untreated occlusion.

**Materials and Methods:** Frontal and profile facial photographs of 24 participants (13 male, 11 female) with acceptable, untreated occlusion, taken during adolescence (mean age = 13.3 years) and late adulthood (mean age = 61.2 years) were used. Groups of 30 orthodontists and 30 laypeople scored the facial attractiveness using a scale from 1 (*unattractive face*) to 10 (*very attractive face*). Raters indicated the apparent age at T2 and the most and least pleasing facial structures. Three-way analysis of variance was used to assess the influence of sex, age, and rater group on facial attractiveness. Mann-Whitney test was used to compare males and females regarding the apparent age perceived by raters at late adulthood (P < .05).

**Results:** Mature age was judged with lower scores on facial attractiveness (mean = 5.43) by both groups compared with adolescence (mean = 6.51). Facial attractiveness was not affected by sex. At late adulthood, females were considered younger by both groups of raters, while men were perceived more similar to their actual age. Laypeople were slightly more critical than orthodontists in the assessment of facial attractiveness. Thirty percent of the raters indicated the eyes as the most pleasant region and the chin and nose as the least pleasing structures.

**Conclusions:** Facial attractiveness slightly decreased from adolescent to mature ages. Women appeared younger than their actual age at late adulthood. (*Angle Orthod*. 2025;95:310–316.)

KEY WORDS: Normal occlusion; Adults; Maturation; Aging

Facial esthetics is an important factor for daily social interactions and quality of life. Mueser et al.<sup>1</sup> stated that the face was a slightly more important predictor of overall attractiveness than the body. Dental appearance influences facial attractiveness, regardless of sex.<sup>2</sup> However, changes in the lips and chin contribute more than appearance of the teeth in this domain.<sup>3</sup> The eyes, oral region, and skin also significantly contribute to overall facial attractiveness.<sup>4,5</sup> Additionally, facial and smile esthetics decrease as a person gets older, increasing motivation for seeking orthodontic treatment and rejuvenation procedures by adults.<sup>6–8</sup>

Aging predominantly affects soft tissues.<sup>9,10</sup> Authors of a study performed from 3 years to 18 years of age showed that the nose continues to grow downward and forward, and the upper and lower lips displayed a constant relationship to the anterior teeth.<sup>11</sup> In an untreated sample from 25 years to 83 years of age, Behrents<sup>9</sup>

<sup>&</sup>lt;sup>a</sup> Private practice, Dourados, MS, Brazil.

<sup>&</sup>lt;sup>b</sup> PhD Student, Department of Orthodontics, Bauru Dental School, University of São Paulo, Bauru, SP, Brazil.

<sup>&</sup>lt;sup>c</sup> Assistant Professor, Department of Orthodontics, Bauru Dental School, Hospital for Rehabilitation of Craniofacial Anomalies, University of São Paulo, Brazil.

<sup>&</sup>lt;sup>d</sup> Assistant Professor, Department of Orthodontics, Bauru Dental School, University of São Paulo, Brazil.

<sup>&</sup>lt;sup>e</sup> Professor, Department of Orthodontics, Bauru Dental School, Hospital for Rehabilitation of Craniofacial Anomalies, University of São Paulo, Brazil.

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Corresponding author: Dr Ivan Silva, Department of Orthodontics, Bauru Dental School, University of São Paulo, Alameda Octávio Pinheiro Brisolla 9-75, Bauru, SP 17012-901, Brazil (e-mail: ivandesouzaodonto@gmail.com)

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INTRODUCTION

showed elongation of the nose, flattening of the lips, and augmentation of the chin. Garib et al.<sup>10</sup> evaluated a normal occlusion sample at 17 years and 60 years of age and found closure of the nasolabial angle, upper lip retrusion, and an increase of the soft tissue chin. Maxillary incisor display by the upper lip decreased 3.6 mm in 40 years.<sup>10</sup> Aging also resulted in wrinkling of facial skin, loss of elasticity and volume, with deeper nasolabial sulcus and mentolabial sulcus and a more apparent infraorbital rim.<sup>8,12</sup>

Facial attractiveness declines with aging.<sup>13–15</sup> Authors of few studies have explored the effects of aging on facial attractiveness. Authors of a previous study showed a progressive decrease of facial attractiveness from 3 years to 16 years of age assessed by psychology students.<sup>16</sup> From 11 years to 31 years of age, facial attractiveness judged by laypeople decreased, but attractive children remained attractive as adults.<sup>14</sup> Older faces were perceived as less attractive, particularly in the eyes, nose, and mouth.<sup>17,18</sup>

Researchers have indicated that female attractiveness diminishes faster than male attractiveness with age, with men favoring mature features and women youthful ones.<sup>13,14,19,20</sup> Authors of a study analyzing facial esthetics from 1940 to 2008 found a growing preference for fuller lips in women and stronger chins in both genders.<sup>21</sup>

The impact of aging on facial esthetics in untreated individuals with acceptable occlusion remains unclear. Authors of previous studies on aging assessed different age groups,<sup>17,18</sup> used digitally manipulated images,<sup>22</sup> and did not specify the type of malocclusion.<sup>11,14,16</sup> Few longitudinal studies, in which authors evaluated the same participants over time, have been conducted.<sup>13–15</sup> Therefore, the objective of this study was to longitudinally evaluate the facial attractiveness at adolescence and late adulthood in untreated individuals with acceptable occlusion. The null hypothesis was that facial attractiveness would be similar in both age groups.

#### MATERIALS AND METHODS

This study was approved by the Ethics in Research Committee at Bauru Dental School, University of São Paulo (Process 22082119.3.000.5417). Written informed consent was obtained from patients and raters.

The sample was obtained from an initial sample of 82 White Brazilians collected from 1967 to 1974 from the files of the Department of Orthodontics at the university. Frontal and profile facial photographs, dental models, and cephalograms were obtained at a mean age of 13.33 years, ranging from 11.89 years to 15.03 years (T1). The individuals had a complete permanent dentition with dental and skeletal Class I relationship, absence of crossbite, normal overjet and overbite, maximum of 2 mm of incisor crowding, and no previous orthodontic treatment. From 2015 to 2016 (T2), the sample was recalled for the aging study. From the initial sample, 38 were reached, and 27 were enrolled. Exclusion criteria were history of orthodontic treatment between T1 and T2 and complete tooth loss in one or both dental arches. The mean age at T2 was 61.27 years (ranging from 58.66 years to 64.20 years). The final sample comprised 24 individuals (13 male and 11 female) with Class I facial pattern and acceptable untreated occlusion.

Facial photographs taken at mean ages of 13 years and 61 years were used. The frontal and profile photographs of each time point were combined to consist of a pair of images, and all pictures were converted to grayscale (Figure 1). T1 and T2 photographs were randomly ordered, and a Google Forms questionnaire (Google LLC, Mountain View, Calif) was created to evaluate facial esthetic and apparent age perceptions.

Potential raters were invited via e-mail and WhatsApp to complete a Google Form questionnaire. Sample size calculation determined that 27 raters per group would be needed to detect a 1-point difference on a 10-point scale, assuming a standard deviation of 1.28 points,<sup>23</sup> with 80% test power and a 0.05 significance level.

Raters provided their birthdate, sex, education, highest degree, and orthodontic experience (for orthodontists). No time limit was given for the evaluations. Each photo pair was rated on a 10-point scale, where 1 indicated *unattractive* and 10 *very attractive*. Raters were asked to identify the most and least pleasing facial features; options included skin, forehead, eyes, nose, lips, chin, and others. Additionally, they assessed the apparent age of the individuals in late adulthood photos.

The study included 30 laypeople and 30 orthodontists. *Laypeople* were defined as individuals with higher education but no dental background and from different professional fields. *Orthodontists* were dentists with graduate degrees in orthodontics.

## **Error Study**

One month after the initial evaluation, 30% of the raters reassessed the same participants to measure consistency in rating facial attractiveness. Intrarater reliability was determined using intraclass correlation coefficients.<sup>24</sup>

#### **Statistical Analyses**

Normal distribution was tested using the Shapiro-Wilk test, and only the variable apparent age showed a nonnormal distribution (P < .001). Sex and age distribution between rater groups were compared with  $\chi^2$  and Mann-Whitney tests, respectively. The effects of sex, age stage, and rater group on facial attractiveness were analyzed using three-way analysis of variance. Apparent age at T2 was compared between males and females with



Figure 1. Facial photographs in frontal and lateral view taken at 13 and 61 years of age from (A) female and (B) male participants from the sample.

Mann-Whitney tests. Statistical analyses were performed using Jamovi software (version 1.2.22) (The Jamovi Project, Sydney, Australia.). Results were considered significant at P < .05.

#### RESULTS

The intraclass correlation coefficient evaluating consistency in ratings of facial attractiveness varied from 0.77 (mean range of 5.58 to 5.66; SD of 1.05 to 1.17) to 0.82 (mean range of 6.50 to 6.38; SD of 1.58 to 1.64) for laypeople and orthodontists, respectively, showing good intrarater agreement. The laypeople group had significantly more men, and the orthodontist group had more women. Laypeople were significantly older than the orthodontists (Table 1).

Table 1. Comparison of Sex  $(\chi^2 \, {\rm Test})$  and Age (Mann-Whitney Test) Between Groups of Raters

Variable	Laypeople (n = 30)	Orthodontists (n = $30$ )	P Value
Male	22	9	<.001*
Female	8	21	
Age (y)	$33.47\pm7.82$	$29.71\pm8.55$	.002*

\* Statistically significant at P < .05.

Regarding facial attractiveness (Table 2), individuals at mature age were judged with the lowest scores (mean =  $5.43 \pm 1.88$ ) compared with during adolescence (mean =  $6.51 \pm 1.80$ ). A moderate effect size (0.59) was observed for the difference, demonstrating a considerable magnitude for the score difference. Laypeople were slightly more critical than orthodontists (P < .001), assigning mean scores of 5.68 and 6.27, respectively. A small effect size (-0.31) was observed, demonstrating a subtle magnitude for the score difference. Facial attractiveness was not affected by sex of the photographed sample. The interaction between age stage, sex, and type of rater showed no influence on facial attractiveness. At late adulthood, women were judged younger than men by both groups of raters (Table 3). A moderate effect size (-0.46) and a small effect size (-0.27) were observed for the differences for laypeople and orthodontists, respectively, regarding perceived apparent age. Laypeople evaluated the apparent age younger than orthodontists (P < .001), and they were less accurate when estimating the sample age. (Table 3). A moderate effect size (0.47) was observed for the difference, demonstrating a

**Table 2.** Comparison of Facial Attractiveness Scores by SampleAge Stage, Sex, and Type of Raters (Three-Way Analysis of Variance)

Group	Score, mean $\pm$ SD	P Value	d
Age			
Adolescence	$6.51 \pm 1.80$	<.001*	0.59
Late adulthood	$5.43 \pm 1.88$		
Sex			
Male	$5.96 \pm 1.93$	.757	-0.01
Female	$5.98 \pm 1.89$		
Raters			
Lavpeople	$5.68 \pm 1.91$	<.001*	-0.31
Orthodontists	6.27 ± 1.88		
Age  imes sex			
Adolescence		.657	
Male	$6.49 \pm 1.85$		-0.02
Female	$6.54 \pm 1.73$		
Late adulthood			
Male	5.43 ± 1.87		0.004
Female	5.42 ± 1.88		
Age $\times$ raters			
Adolescence		.457	
Lavpeople	$6.19 \pm 1.83$		-0.35
Orthodontists	6.83 ± 1.71		
Late adulthood			
Lavpeople	$5.16 \pm 1.85$		-0.29
Orthodontists	$5.70 \pm 7.87$		
Raters $\times$ sex			
Laypeople		.984	
Male	$5.67 \pm 1.95$		-0.01
Female	$5.69 \pm 1.86$		
Orthodontists			
Male	$6.26 \pm 1.88$		-0.01
Female	$6.28 \pm 1.88$		
Age $ imes$ raters $ imes$ sex			
Adolescence		.829	
Laypeople			
Male	$6.18 \pm 1.87$		-0.01
Female	6.21 ± 1.78		
Orthodontists			
Male	$6.80\pm1.79$		-0.03
Female	$6.87 \pm 1.62$		
Late adulthood			
Laypeople			
Male	$5.17 \pm 1.89$		-0.002
Female	$5.16 \pm 1.80$		
Orthodontists			
Male	5.71 ± 1.80		0.01
Female	$5.69 \pm 1.94$		

\* Statistically significant at P < .05.

considerable magnitude for the intergroup difference in apparent age perception.

The eyes were considered the most pleasant structure at both ages (31.9% and 28.6%, respectively), as shown in Figure 2. At late adulthood, 22.5% of the raters reported that none of the facial structures were the most pleasant. During adolescence, the chin (25.8%) was indicated as the least pleasant structure. On the other hand, in late adulthood, the lips were considered the least pleasant facial structure (24.9%) followed by the nose (17%).

 Table 3.
 Comparison Between Perceived Age of Males and

 Females at Late Adulthood Between Groups of Raters (Mann-Whitney

 Tests)

Group	Median (Mean)	Interquartile Range (SD)	<i>P</i> Value	d
Laypeople	CO O (FO O)	10 (0 10)	< 001*	0.40
Male Female	60.0 (59.9) 57.0 (56.6)	10 (8.12) 11 (7.57)	<.001*	-0.46
Orthodontists				
Male	62.0 (62.4)	6.5 (6.47)	<.001*	-0.27
Female	60.0 (60.2)	10 (7.27)		
Laypeople	59.0 (58.2)	11 (8.08)	<.001*	0.47
Orthodontists	62.0 (61.8)	7 (7.04)		

\* Statistically significant at P < .05.

#### DISCUSSION

The influence of orthodontic treatment on facial attractiveness is well established.<sup>23,25–27</sup> In this study, we examined the impact of aging on facial attractiveness in untreated individuals with balanced faces and acceptable occlusion over 50 years. Challenges in recalling participants arose due to changes in phone numbers, addresses, and marital names for women.

Facial attractiveness is influenced by age, sex, and type of raters as well as by the sex and age of the participants evaluated.<sup>17</sup> For the current study, orthodontists and laypeople rated facial attractiveness using a simple 10-point numerical scale, a method shown to be reliable in previous studies.<sup>23,25,28,29</sup>

Mature age was considered less attractive than adolescence. This agreed with previous studies, in which authors showed that facial attractiveness decreases with age.<sup>13–15</sup> The mean score for facial attractiveness changed from 6.5 to 5.4 in 48 years, and the difference showed a moderate effect size (Table 2). Considering the long interval between 13 to 61 years of age, the reduction of facial attractiveness was not remarkable, and the moderate effect size indicated that the difference between the age groups was noticeable but not particularly strong, which may suggest that the evaluation could be influenced by other factors, such as cultural aspects.<sup>6,8</sup> From the third decade onward, facial changes due to aging are expected, affecting skeletal support, soft tissues, and skin.<sup>8,12</sup> The facial skeleton experiences selective resorption at specific sites, mainly at the periorbital areas and middle cheek.<sup>29</sup> Intrinsic factors such as hormonal changes and extrinsic factors, including gravity, smoking, sun exposure, and body mass index, influence facial aging.<sup>8,12,29</sup> Fat and muscle atrophy leads to depression in the orbital and buccal areas.<sup>8</sup> The skin becomes thinner, less elastic, more irregular, and wrinkled.<sup>12</sup> Submental fat excess and jowl formation are expected in the lower face and neck.<sup>8</sup> Excessive sun



Figure 2. Most and least pleasing structures at adolescence and late adulthood.

exposure and smoking accelerate the facial aging process.<sup>30</sup> By the sixth decade of life, deep wrinkles in the forehead and glabella, drooping of the nose, lower eyelid, and jowl formation are expected.<sup>8</sup> In the sample, none of the participants had plastic surgery, so natural aging effects were visible, justifying reduced attractiveness scores at mature age, consistent with previous studies.<sup>17,31</sup>

Laypeople were slightly more critical than orthodontists, in agreement with previous studies.<sup>3,23,25</sup> Laypeople are constantly influenced by beauty standards imposed by social media, which has promoted antiaging procedures, making people more critical when considering facial appearance.<sup>32</sup> The orthodontists were more tolerant regarding facial attractiveness and evaluated the apparent age closer to the real age. This result might be due to orthodontists' knowledge regarding facial aging.<sup>10</sup> From a broader perspective, it is clinically relevant to understand how facial attractiveness classification is influenced by patient age and how they perceive themselves. These results prepare the clinician for orthodontic treatment outcomes, especially since a significant change is expected in the face of adults.

Apparent age is well documented in plastic surgery literature<sup>30,33</sup> but is rarely explored in orthodontics, despite the emphasis on soft tissue maturation.<sup>11,34,35</sup> Assessing apparent age in older individuals provides insights into aging effects on facial appearance. In this study, females were rated as younger than males, aligning with findings from a study of Chinese participants aged 20 to 60, where men were judged older.<sup>35</sup> Another study performed in participants from 20 years to 40 years showed that facial aging of males started 10 years later than for females.<sup>36</sup> However, aging changes were of greater magnitude in

men.<sup>36</sup> The attribution of older ages to men and younger ages to women is probably because women are generally more careful regarding health and facial appearance.<sup>37</sup> A comparison of facial skin in Asian women from 14 years to 75 years of age showed that earlier adoption of a skincare routine was associated with less severe photodamage and may help in reducing the impact of age on skin health.<sup>38</sup> In a sample of 45 men between 20 years and 50 years of age, 40% did not have a skincare routine and tended to avoid using skincare products that can increase a sticky or tacky feeling on the skin.<sup>39</sup> In the laypeople group, the effect of sex was more noticeable in estimating the apparent age compared with orthodontists. Considering the effect size, the difference between laypeople and orthodontists noticeably influenced the estimation of participant ages.

The eye region was rated as the most pleasant feature in both adolescence and late adulthood (Figure 2). This finding agreed with those of a recent study in which authors showed that facial masks enhanced the attractiveness of less attractive faces, highlighting the importance of the eyes in perceived attractiveness.<sup>40</sup> The most unpleasant structure at adolescence was the chin. The chin position has been shown to influence facial attractiveness and social perception.41 At T1, patients that had a slightly retrognathic mandible with a deeper mentolabial sulcus were assigned unpleasant chin by raters. Authors of a previous study assessed the influence of chin prominence on facial esthetics and showed that facial esthetics decreased with chin retrusion and increased with chin protrusion.<sup>41</sup> For the mature adults, lips were rated the least attractive feature. Aging leads to volume loss and retrusion of the lips, resulting in a thinner vermillion border.<sup>10</sup> The loss of volume might have influenced these outcomes.<sup>3</sup> Since the first decade of the 21st century, more full and protrusive lips for all ages were preferred.<sup>3,21</sup> Orthodontists have recognized lips as a major influence on facial attractiveness,<sup>3</sup> and overretraction of the lips should be avoided to prevent reduced attractiveness with aging.

In summary, the findings of this study reinforced that facial attractiveness declines with age, and women tend to appear younger than men in late adulthood. A limitation of the study was the absence of facial photos from an intermediate time point between adolescence and mature age. Authors of future studies should include facial attractiveness assessments every 10 years to pinpoint when the most significant changes occur. The results should be interpreted with caution since the mean ages between groups of raters were different, although all respondents belonged to the same generation. Therefore, involving a larger number of evaluators with different and balanced age groups would help clarify how facial attractiveness is perceived across age groups.

## CONCLUSIONS

- Photographs of individuals at a mature age received lower rating scores for facial attractiveness than during adolescence.
- Women appeared to be younger than men at a mature age.
- At adolescence and at a mature age, the eye region was rated as the most pleasant structure.
- The chin and lips were considered the most unpleasant structures at 13 and 61 years of age, respectively.

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