Quantiﬁcation of facial and smile esthetics

Vasiliki P. Koidou, DDS,a Georgios S. Chatzopoulos, DDS,b and Stephen F. Rosenstiel, BDS, MSDc

ABSTRACT

Statement of problem. Whether deviations in alignment discrepancy, width-to-length ratio, application of the golden proportion, or number of teeth revealed in smile affect attractiveness is yet unknown.

Purpose. The purpose of this analytical study was to quantify dental and facial esthetics to determine whether individuals identiﬁed as having superior smiles display differences in alignment discrepancies (angulation between interpupillary and commissure line); width-to-length ratios of maxillary anterior teeth; application of the golden proportion (approximately 1.618:1); and number of teeth revealed in an animated smile when compared with an average population.

Material and methods. An Internet search for “best smile” and “celebrity” identiﬁed 108 celebrities. Photographs showing smiles within 10 degrees of a frontal view were collected, while photographs of dental students were used for the control group. Alignment discrepancies, widths and lengths of the anterior teeth, and number of teeth revealed in an animated smile were measured with photo-editing software, and ratios were calculated. The groups were compared with repeated-measures ANOVA, the Mann-Whitney U test, and the Wilcoxon signed-rank test (α=.05).

Results. Usable photographs were obtained for 90 celebrities (58 women, 32 men) and compared with photographs of 97 dental students (54 women, 43 men). Statistically signiﬁcant differences were found for alignment discrepancies (celebrities 0.97, students 1.25, P=.034) and for the number of teeth displayed (P=.049); 22.2% of the celebrities revealed 12 teeth, versus 6.2% of the students. In both groups, signiﬁcant differences from the golden ratio (1.618:1) for the width of the central incisor/lateral incisor right and left and for the width of the lateral incisor/canine right and left were observed through 95% conﬁdence intervals. Sex and left-right were nonsigniﬁcant factors.

Conclusions. Celebrities identiﬁed as having a best smile had smaller mean alignment discrepancies and revealed a greater number of teeth in an animated smile than dental students.

(J Prosthet Dent 2018;119:270-277)
**Clinical Implications**

This study highlights the role that symmetry and parallelism play through dental elements in the perception and interpretation of beauty. Clinicians should be aware of alignment discrepancies and the number of teeth displayed in an animated smile when evaluating extensive prosthetic treatment.

similar for male and female faces. In contrast, while averageness has been identified as a decisive factor in the perception of attractiveness, with an effect independent of sex, symmetry has been highlighted as preferable for male but not for female faces.10

Lombardi3 highlighted that “the most harmonious relationship that can exist between two lines is a parallel relationship, because it exhibits the least possible contrast” and as such suggested establishing parallelism when attempting to reconstruct facial or dental esthetics. Fradeani11 supported the concept that the interpupillary line, if parallel to the horizontal plane, is the most suitable reference for carrying out appropriate facial analysis. In this context, the ophriac (eyebrows), commissural (lips), and interalar (nose) lines are also expected to be parallel to the horizontal plane and contribute to overall harmony. In contrast, Namano et al,12 in a study investigating the angulations between the horizontal plane, the interpupillary line, the commissure line, and the intercanine line, concluded that angular asymmetry is present and is not influenced by age, sex, history of dental trauma, or orthodontic treatment.

In an endeavor to understand the role of different aspects of esthetics in the perception of attractiveness, guidelines have been developed for the reconstruction of facial and dental esthetics. Accordingly, the optimal width-to-length ratios of the maxillary central incisors have been reported to be between 75% and 85% when assessed by laypersons and between 75% and 80% when assessed by dentists.13 The mean width-to-length ratio of anatomic crowns of unworn maxillary central incisors ratios has been reported to range from 78% to 85%.14,15 These values often vary from the clinically observed dimensions of the maxillary anterior teeth because of the incisal wear or attachment loss associated with periodontal disease or treatment. As an example, worn central incisors have been reported to present width-to-length ratios of 87%.15 Furthermore, in a comparison study of Asian and white individuals, ethnicity was found to affect the width-to-length ratios of the maxillary anterior teeth.16

The golden proportion, based on the Pythagorean theorem (1/1.618=0.618), is a concept that has been widely applied in both science and art. Lombardi3 first discussed using this concept to develop a proportionate relationship between the dimensions of the maxillary central, lateral incisor, and canine but found the golden proportion “too strong for dental use.” Levin17 supported the golden proportion as the most harmonious recurrent tooth-to-tooth ratio, whereas Snow18 concluded that the analysis of the dimensions of the maxillary anterior as a percentage of the total canine-to-canine width is more useful than the mere application of the golden proportion to each individual tooth. Interestingly, Rufenacht19 noted that the concept of the golden proportion refers to an observation of just a portion of the tooth—for example, from a frontal view.

Recent investigations have highlighted that the mere application of the golden proportion for the rehabilitation of the maxillary anterior dentition may not be that natural or esthetically pleasing.20-22 However, Pini et al,23 examining a sample of individuals with lateral incisor agenesis, concluded that the golden proportion was more commonly found in the relationship of the widths of the central and lateral incisors.

During an animated smile, the lips control the visible teeth and gingiva and thus play a critical role in an esthetic smile.24 Variations in tooth display have been found between individuals based on sex and age. The reduction of the elasticity of the lip during aging is considered to lead to less maxillary display, with women generally displaying more maxillary teeth than men.25 The number of teeth displayed during a smile plays a pivotal role in predicting attractiveness.26 In the endeavor to define traits and motifs that define attractiveness, differences in perceived esthetics have been attributed to factors such as sex or academic or professional training.27-30

The purpose of this analytical study was to investigate whether individuals commonly identified as having a superior smile have similar alignment discrepancies (angulation between the interpupillary and commissural line) as individuals representing the average population, present width-to-length ratios in agreement with the literature, demonstrate agreement of the relationships of the 6 maxillary anterior teeth with the golden proportion, and present as many teeth in an animated smile as individuals representing the average population.

**MATERIAL AND METHODS**

The methodology used in the present investigation has been described previously.31 Initially, a list of celebrities (test group) identified as having esthetic smiles was created. By entering the search words “best smile” or “ideal smile” and “celebrities” or “Hollywood” in an Internet search engine, a list of 108 celebrities was obtained, and a library of their photographs (108) was...
A rotation test was conducted on a mannequin to investigate whether the calculated alignment discrepancy varied significantly enough because of rotation of the head to confound the measurements of the main investigation. This mannequin rotation test has been described in detail elsewhere. Briefly, a mannequin was subjected to a series of rotations of the head at angles of 0, 2, 4, 6, 8, 10, 12, and 16 degrees. The alignment discrepancy between the interpupillary and the intercanine line was measured on the mannequin, and the results of the Tukey HSD test concluded that rotations of the head smaller than 10 degrees of alignment angle did not significantly affect the angulation discrepancy measurements. Thus, images with a rotation of the head of more than 10 degrees of alignment angle were excluded from the main investigation.

For the main investigation, of the initial 108 celebrities, 90 usable pictures of 90 individuals (83.3%) were included. In a previous report of the same group, the same sample size was used and demonstrated adequate power to detect significance between the examined groups. The exclusion criteria applied included rotation of the head larger than 10 degrees, no frontal views, inability to detect both commissures in an exaggerated smile, and inadequate display of the 6 maxillary anterior teeth.

The assessment of the images included saving the image as a file and opening it in photo-editing software (Photoshop vCS4; Adobe Systems Inc), then cropping and resizing it to consistent dimensions, resolution, and magnification. The angulation between the interpupillary line and the horizontal plane and the angulation between the commissure line and the horizontal plane were calculated with the measuring tool of the software. The alignment discrepancy between the commissure and the interpupillary line was further estimated. In addition, the widths and lengths of the 6 maxillary anterior teeth and the number of teeth displayed in an animated smile were calculated. Finally, ratios for the relationships between the maxillary anterior teeth were calculated. The actual and perceived sizes of the anterior teeth when viewed frontally differ because of the maxillary arch curvature and the tooth angulation in relation to the frontal plane. Because of this discrepancy, the results of this investigation need to be interpreted cautiously.

Next, measurements were conducted for the dental students group (control) with the same exclusion criteria applied. With the use of the photo-editing software, the alignment discrepancy, widths and lengths, and number of teeth on display were calculated, as described previously. The final data comprised 90 individuals for the celebrities (58 women, 32 men) and 97 for the dental students (54 women, 43 men).

Descriptive statistics for quantitative variables were calculated by using minimum and maximum ranges, median, mean, and SD, while for the number of teeth on display, frequencies and percentages were presented. The normality assumption was tested either by the Kolmogorov–Smirnov test (n>50) or by the Shapiro–Wilk test (n<50). The Levene test was used for the homogeneity of variances assumption. Concerning nonnormal data, comparisons between independent groups were performed with the Mann-Whitney U statistic, while the Wilcoxon signed-rank test was used for related data. For normal data with homogeneous variances, the analysis of variance model was conducted (2-way ANOVA) with group (students and celebrities) and sex (male and female) as factors. The absolute differences from the golden proportion (1.618) according to width of the central incisor/lateral incisor right or left and width of the lateral incisor/canine right or left in both groups (students and celebrities) were observed through 95% confidence intervals. A reliability analysis was also completed from images of 9 individuals derived from both groups who were not included in the main investigation. The overall analysis was conducted by statistical software (IBM SPSS Statistics v19; IBM Corp) (α=.05).

RESULTS

The final sample for the celebrity (test) group comprised a total of 90 photographs and the student (control) group a total of 97. The resulting intraclass correlation coefficient for the reliability analysis was 0.9425, indicating very good reliability.

Alignment discrepancy

The mean alignment discrepancies (angulation between the interpupillary and commissure line) for the celebrity group was 0.97 degrees and for the student group was 1.25 degrees (Table 1, Fig. 1). The celebrity group included 32 men with a median alignment discrepancy of 0.65 and 58 women with a mean alignment discrepancy of 0.70, while the student group included 45 men with a median alignment discrepancy of 1.00 and 52 women with 0.95 (Table 1). The test showed the presence of statistically significant (P=.034) differences in alignment discrepancies, with celebrities presenting with a smaller median alignment discrepancy (0.70) than students (1.00) (Fig. 1). No statistically significant differences were found for sex (P>.05).
Because of the normality of the distribution, 2-way ANOVA was used to compare the width-to-length ratios of the maxillary anterior teeth (Table 2). The mean width-to-length ratio for students was found to be 0.84 on the right and 0.82 on the left central incisor, while the celebrities exhibited a ratio of 0.85 on the right and 0.82 on the left central incisor. Likewise, the mean ratio for the right lateral incisor was 0.69 for the control and 0.68 for the test group. For the left lateral incisor, the corresponding mean values were 0.65 and 0.67. Regarding the canines, the mean width-to-length ratio ranged between 0.52 and 0.56. Sex and the interaction between sex and group did not show any significant association with the mean width-to-length ratio (P > .05). The mean ratio for the right canine was found to be significantly different between the 2 groups, with the mean value for the students being 0.56, while for the celebrities 0.52 (P = .045).

Figure 2 presents the mean values and 95% confidence interval for the width-to-length ratios of the anterior maxillary teeth.

**Width ratios of maxillary anterior relative to golden proportion**

Table 3 presents the calculated mean difference from the golden proportion (1.618), 95% confidence intervals and SD for the width of the central incisor to the width of the lateral incisor right and left and the width of the lateral incisor to the width of the canine right and left. The test and control group did not show any statistically significant differences (Table 3). Overall, the calculated confidence intervals varied significantly from 0, suggesting that the width ratios of the maxillary anterior teeth differed from the golden proportion for both celebrities and students (Fig. 3).

**Number of teeth revealed in an animated smile**

The Mann-Whitney U test was used to compare the number of teeth on display between the celebrity and student groups. A statistically significant difference between the 2 groups was detected (P = .049). Moreover, 20 (22.2%) of 90 celebrities demonstrated 12 teeth in animated smile compared with only 6 (6%) of 97 students.

The distribution of the number of teeth revealed for both is shown in Figure 4.

**DISCUSSION**

The present study examined the alignment discrepancies (angulation between the interpupillary and commissure line), the width-to-length ratios of the maxillary anterior, the width ratios of the maxillary anterior relative to the golden proportion, and the number of teeth revealed in an animated smile in a group of individuals identified as having attractive smiles and a group of dental students serving as a control. The results of the present analytical investigation rejected the first and last null hypotheses and revealed that celebrities, identified from frontal view photographs as having a “best smile,” have significantly smaller mean alignment discrepancies and reveal more teeth in an animated smile than the student control group.

The mean angulation discrepancy in the present study was found to be 0.97 degrees for celebrities identified as presenting an attractive smile and 1.25 degrees for dental students (P < .05). This statistically significant difference...
highlights the presence of a superior sense of parallelism in smiles identified as attractive compared with average smiles. In a recent investigation examining the presence of parallelism between the intercanine and the interpupillary line, Koidou et al. concluded that celebrities identified as having a best smile had significantly smaller mean angulation discrepancies than the control group. According to Fradeani, this parallelism, when present, facilitates correct facial analysis. Furthermore, Namano et al. reported on the ranges of the angulation of the commissure line to the horizontal of $-5.4$ to $7.0$ degrees.

In the present investigation, the angulation of the commissure line to the horizontal could not be directly calculated, but the angulation of the commissure line to the interpupillary line ranged between $0.70$ and $6.00$ degrees.

The present study found the mean width-to-length ratios of the maxillary incisors to range between $0.82$ and $0.85$ for the central incisor for both dental students and celebrities. This finding is in agreement with previous investigations that report the ideal relationship between the width and the length of a maxillary incisor to range between $0.75$ to $0.85$. In comparison, for the lateral incisors, the present study reports ratios ranging from $0.65$ to $0.69$ for celebrities and students. However, no significant differences were observed between celebrities and dental students.

This investigation also examined the agreement of the width ratios of the maxillary anterior teeth with the golden proportion (difference of the calculated ratio from 1.618) and failed to demonstrate any significant agreement for either the group of celebrities or the group of dental students. This finding is in agreement with available literature. Hasanreisoglu et al. in a Turkish population and Jin et al. in a Korean population failed to detect any significant agreement with the golden proportion. However, the examined group in the present investigation (celebrities group) was selected as exhibiting a superior degree of attractiveness than the randomly selected individuals in the aforementioned investigations. Furthermore, in the present investigation, the least differences from the golden proportion ratios were identified for the width ratio of central incisors to lateral incisors (0.18 to 0.20, $P<.05$), similar to previous investigations.

Regarding the number of teeth revealed in an animated smile, the present investigation concluded that celebrities presented with a significantly higher number of teeth revealed while smiling than dental students. In a similar study that evaluated the various esthetic smile criteria based on the smiles of celebrities, 60% of the female celebrities were found to display up to the second premolar (10 teeth) and 32% up to the first molar (12 teeth) when smiling. In another study, 85% of first and 83% of second premolars were visible. Sixty-eight percent of the examined photographs completely

### Table 2. Descriptive statistics and results of comparison of dependent variable width-to-height ratio between students and celebrities

<table>
<thead>
<tr>
<th>Ratio</th>
<th>Group</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Median</th>
<th>Mean</th>
<th>SD</th>
<th>95% CI for Mean</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>W/H CE right</td>
<td>Students</td>
<td>43</td>
<td>0.67</td>
<td>1.26</td>
<td>0.83</td>
<td>0.84</td>
<td>0.10</td>
<td>0.81</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td>Celebrities</td>
<td>35</td>
<td>0.64</td>
<td>1.46</td>
<td>0.85</td>
<td>0.85</td>
<td>0.14</td>
<td>0.81</td>
<td>0.90</td>
</tr>
<tr>
<td>W/H LA right</td>
<td>Students</td>
<td>62</td>
<td>0.46</td>
<td>0.93</td>
<td>0.69</td>
<td>0.69</td>
<td>0.09</td>
<td>0.67</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td>Celebrities</td>
<td>46</td>
<td>0.47</td>
<td>0.99</td>
<td>0.69</td>
<td>0.68</td>
<td>0.11</td>
<td>0.65</td>
<td>0.71</td>
</tr>
<tr>
<td>W/H CA right</td>
<td>Students</td>
<td>43</td>
<td>0.40</td>
<td>0.75</td>
<td>0.57</td>
<td>0.56</td>
<td>0.09</td>
<td>0.54</td>
<td>0.59</td>
</tr>
<tr>
<td></td>
<td>Celebrities</td>
<td>26</td>
<td>0.36</td>
<td>0.76</td>
<td>0.51</td>
<td>0.52</td>
<td>0.09</td>
<td>0.48</td>
<td>0.56</td>
</tr>
<tr>
<td>W/H CE left</td>
<td>Students</td>
<td>36</td>
<td>0.68</td>
<td>0.96</td>
<td>0.82</td>
<td>0.82</td>
<td>0.07</td>
<td>0.80</td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td>Celebrities</td>
<td>34</td>
<td>0.67</td>
<td>1.00</td>
<td>0.83</td>
<td>0.82</td>
<td>0.09</td>
<td>0.79</td>
<td>0.85</td>
</tr>
<tr>
<td>W/H LA left</td>
<td>Students</td>
<td>56</td>
<td>0.44</td>
<td>0.83</td>
<td>0.65</td>
<td>0.65</td>
<td>0.08</td>
<td>0.63</td>
<td>0.67</td>
</tr>
<tr>
<td></td>
<td>Celebrities</td>
<td>47</td>
<td>0.51</td>
<td>1.00</td>
<td>0.66</td>
<td>0.67</td>
<td>0.09</td>
<td>0.64</td>
<td>0.69</td>
</tr>
<tr>
<td>W/H CA left</td>
<td>Students</td>
<td>37</td>
<td>0.33</td>
<td>0.69</td>
<td>0.52</td>
<td>0.52</td>
<td>0.09</td>
<td>0.49</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td>Celebrities</td>
<td>34</td>
<td>0.37</td>
<td>0.70</td>
<td>0.53</td>
<td>0.53</td>
<td>0.08</td>
<td>0.50</td>
<td>0.55</td>
</tr>
</tbody>
</table>

CA, canine incisor; CE, central incisor; CI, confidence interval; LA, lateral incisor; W/H, width to height. *P<.05.
displayed the second maxillary premolars compared with less than 50% displaying up to the first premolar. Higher smile lines result in more visible teeth and are associated with increased esthetic demands in the restoration of posterior teeth.34 Regardless of the findings of the present investigation, higher smile lines result in more visible teeth and are associated with increased esthetic demands in the restoration of posterior teeth.34

Regardless of the findings of the present investigation—that the alignment discrepancy and number of teeth revealed in an animated smile significantly differ in individuals identified as having attractive smiles compared with dental students serving as a control—one may question whether these elements predict or even affect the perception of attractiveness. A recent study highlighted that the mini- and microesthetics of smile, such as the visibility of buccal corridors, teeth and gingival display, thickness of lip, lack of parallelism of the occlusal plane, and application or not of the golden proportion in the maxillary anterior do not have a significant psychological impact.35 In this context, a slight deviation from parallelism or symmetry may play only a minor role in the perception of overall attractiveness.

Many factors have been identified as playing a crucial role in the perception and decoding of attractiveness. Interestingly, differences in the assessment of attractiveness may exist as an effect solely of sex or education. Previous findings support that dental appearance is more important for women than for men.27 Furthermore, Wolfart et al28 examined the relationship between the subjective judgment of individuals’ dentition and objective measurements (such as width, height, and ratios) of the maxillary incisors. A statistically significant correlation between the objective and subjective evaluation was shown, but only for male participants. In addition, the degree of satisfaction for appearance relative to the golden proportion was higher for men than for women. These findings may imply that the perception of esthetics may differ between men and women such that men present as more rational, whereas women seem more intuitive and emotional.29 Furthermore, differences in the perception of attractiveness have been reported to vary on the basis of academic or professional training. Laypersons, dental students, and dental professionals reportedly present with different perceptions.

### Table 3. Descriptive statistics for absolute difference from golden proportion (1.618) per group and parameter and per parameter left and right side

<table>
<thead>
<tr>
<th>Golden Proportion</th>
<th>Group</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Median</th>
<th>Mean</th>
<th>SD</th>
<th>95% CI for Median</th>
<th>P</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Width CE/LA right</td>
<td>Students</td>
<td>97</td>
<td>0.01</td>
<td>0.54</td>
<td>0.21</td>
<td>0.20</td>
<td>0.12</td>
<td></td>
<td>.18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Celebrities</td>
<td>90</td>
<td>0.01</td>
<td>0.63</td>
<td>0.20</td>
<td>0.19</td>
<td>0.12</td>
<td></td>
<td>.17</td>
</tr>
<tr>
<td></td>
<td>Width LA/CA right</td>
<td>Students</td>
<td>97</td>
<td>0.02</td>
<td>0.80</td>
<td>0.48</td>
<td>0.45</td>
<td>0.19</td>
<td></td>
<td>.17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Celebrities</td>
<td>90</td>
<td>0.02</td>
<td>0.91</td>
<td>0.41</td>
<td>0.41</td>
<td>0.17</td>
<td></td>
<td>.37</td>
</tr>
<tr>
<td></td>
<td>Width CE/LA left</td>
<td>Students</td>
<td>97</td>
<td>0.003</td>
<td>1.08</td>
<td>0.18</td>
<td>0.18</td>
<td>0.15</td>
<td></td>
<td>.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Celebrities</td>
<td>90</td>
<td>0.003</td>
<td>0.65</td>
<td>0.20</td>
<td>0.20</td>
<td>0.13</td>
<td></td>
<td>.17</td>
</tr>
<tr>
<td></td>
<td>Width LA/CA left</td>
<td>Students</td>
<td>97</td>
<td>0.07</td>
<td>0.85</td>
<td>0.44</td>
<td>0.43</td>
<td>0.18</td>
<td></td>
<td>.40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Celebrities</td>
<td>90</td>
<td>0.07</td>
<td>0.76</td>
<td>0.47</td>
<td>0.44</td>
<td>0.17</td>
<td></td>
<td>.43</td>
</tr>
</tbody>
</table>

CA, canine incisor; CE, central incisor; CI, confidence interval; LA, lateral incisor. PComparison between students and celebrities for each parameter with Mann-Whitney U test, exact result. PComparison between left and right for each parameter with Wilcoxon test, exact result.

### Figure 3. Median and 95% confidence interval for absolute difference from golden proportion (1.618) for variables: width of central incisor to width of lateral incisor right (W CE/LA R) and left (W CE/LA L), and width of lateral incisor to canine right (W LA/CA R) and left (W LA/CA L).

### Figure 4. Distribution of number of teeth on display among 90 celebrities and 97 students.
In the interpretation of the study results, limitations have to be taken into account before generalization. In the present investigation, we were unable to differentiate between artificial/restored and natural teeth. However, this study aimed to examine the correlation between symmetry and the perception of attractiveness. In this context, whether this symmetry is natural or created by demand plays only a minor role. In addition, an assumption was made that the control group represented an average sample, representative of the general population. However, the use of a control group with an above-average dental awareness may have underestimated the difference between celebrities and the control, unlike true representatives of the general population. Also, no blinding was performed to hide the assignment of photos between the test and control groups, and this may have biased the assessments.

Facial attractiveness is revealed in nature through symmetry, but the mechanism of interpreting beauty is complex, and the addition or modification of minor symmetrical dental elements might not significantly improve the overall attractiveness, at least until we reach a deeper understanding of the mechanisms involved in the decoding of this information. After all, according to Kant, “The beautiful is what pleases universally without a concept.”

This investigation concluded that celebrities identified as having a superior smile present with smaller alignment discrepancies than dental students and display more teeth in an animated smile. As such, clinicians can apply this knowledge in an attempt to reconstruct attractiveness by using symmetry and parallelism to create the ideal smile.

Conclusions

Within the limitations of the present study, the following conclusions were drawn:

1. Celebrities identified as having a best smile had smaller mean alignment discrepancies than dental students.
2. The mean width-to-length ratios of the maxillary incisors ranged between 0.82 and 0.85 for the central incisor for both dental students and celebrities.
3. The width ratios of the maxillary anterior teeth were in agreement with the literature and did not significantly vary between celebrities and students.
4. Celebrities identified as having a best smile displayed more teeth in an animated smile than dental students.

REFERENCES


21. Forster A, Velez R, Antal M, Nagy K. Width ratios in the anterior maxillary incisors ranged between 0.82 and 0.85 for the central incisor for both dental students and celebrities.


Short dental implants retaining two-implant mandibular overdentures in very old, dependent patients: Radiologic and clinical observation up to 5 years


Purpose. To describe the survival rate and peri-implant bone loss in very old patients dependent for their activities of daily living (ADL), treated with mandibular two-implant overdentures (IODs) in the context of a previously reported randomized controlled trial.

Material and Methods. A total of 19 patients received two interforaminal Straumann implants (Regular Neck, 4.1 mm diameter, 8 mm length) that were subsequently loaded with Locator attachments, transforming their preexisting inferior conventional denture into an IOD. The primary outcome measures were implant survival rate and radiographically assessed peri-implant bone loss. Secondary outcome measures included peri-implant probing depth and Plaque Index scores, as well as implant mobility. Nutritional state (body mass index and blood markers) and cognitive state (Mini-Mental State Examination) were also analyzed.

Results. The patient cohort comprised eight men and 11 women with a mean age of 85.7 ±6.6 years. The implant survival rate up to 5 years was 94.7%, with one early and one late implant failure. The mean loss of peri-implant bone height was 0.17 mm per year (95% confidence interval: 0.09 to 0.24; \( P < .001 \)). Peri-implant probing depth and Plaque Index scores were low and stable during the first 2 years, and thereafter increased continuously. Correlation analysis suggests that a reduced cognitive function and nutritional state are not a particular risk factor for accelerated peri-implant bone loss.

Conclusions. The high implant survival and acceptable peri-implant health suggest that neither age nor dependency for the ADLs is a contraindication for the placement of implants. Nevertheless, close monitoring of the patients concerning a potential further functional decline precluding denture management and performing oral hygiene measures is advised.

Reprinted with permission of Quintessence Publishing.