From ancient times, the question of how the harmony of symmetry and proportion relates to the perception of attractiveness has influenced both science and art. It has long been appreciated that the eyes together with the mouth constitute the fundamental lines and border elements of facial composition. Bui et al. examined the effect of tooth and nose modification on the perception of attractiveness and concluded that teeth play a more decisive role than the nose in overall perceived facial attractiveness. However, in a recent study using a computational model, Mu reported that, of 5 facial regions, the eyes together with the nose were the best predictors of attractiveness. The association of patterns with the perception of attractiveness has been examined, and the importance of the presence of an axis for the perception of symmetry and facial attractiveness has been described. Multiple investigations have supported the importance of a vertical axis, whereas others describe the formation of clusters rather than the mere presence of an axis. In a recent study, Silva et al. reported that laypeople preferred symmetrical faces with the commissure line parallel to the interpupillary line and the transverse occlusal plane. If those lines are not parallel, the transverse occlusal plane should have a similar and coincident cant. However, symmetry may not be the sole determinant of attractiveness. If a preference for faces demonstrating symmetry was solely the result of a general preference for mirror symmetry, this effect would be

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 2017;:–:–)
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. Fraadeani11 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 place and contribute to overall harmony. In contrast, Namano et al12 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

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**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 prosthodontic treatment.
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