

Summary of: The influence of varying maxillary incisal edge embrasure space and interproximal contact area dimensions on perceived smile aesthetics

FULL PAPER DETAILS

¹Graduate Student, ²Senior Clinical Lecturer/Honorary Consultant in Restorative Dentistry UCL Eastman Dental Institute, 256 Grays Inn Road, London, WC1X 8LD; ³Consultant/Honorary Senior Lecturer in Orthodontics, UCL Eastman Dental Institute, UCLH Eastman Dental Hospital Honorary Consultant Orthodontist, Great Ormond Street Hospital, Great Ormond Street, London, WC1N 3JH; ⁴Professor of Oral Health Services Research, Peninsula Dental School, University of Plymouth
*Correspondence to: Dr C. Tredwin
Email: c.tredwin@eastman.ucl.ac.uk
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T. E. Foulger,¹ C. J. Tredwin,² D. S. Gill³ and D. R. Moles⁴

Objective The aim of this study was to determine the influence of incisal edge embrasure space and interproximal contact area dimensions on perceived smile aesthetics. **Design** Cross-sectional study. **Setting** Postgraduate dental teaching hospital. **Methods** A photograph of a smiling female, displaying only the lips and maxillary teeth was digitally altered. First, the proportions of the incisal edge embrasure spaces were modified to produce five different images. Secondly, the lengths of the interproximal contact areas were altered to produce five different images. The two sets of photographs were ranked from 'most attractive' to 'least attractive' by 35 dentists, 35 dental technicians and 35 patients. **Results** An embrasure space arrangement where the size of the embrasures increases progressively distally from the midline was deemed most attractive; absence of embrasure spaces was deemed least attractive. In assessing the interproximal contact areas, all groups assessed an arrangement where the areas between the teeth were equal (and 50% the length of the central incisor) as most attractive, and where the contact areas increased in length progressively distally from the midline as least attractive. There were few statistically significant differences between the groups in these perceptions. **Conclusion** Whilst there is broad agreement in what the participant groups deem to be aesthetic, our findings do not wholly correspond to the 'ideals' that have been previously suggested in the dental literature.

EDITOR'S SUMMARY

With the rise of aesthetic dentistry and the increasing demand from patients for the 'perfect smile', it follows that dental professionals need to have an understanding of what a 'perfect' smile actually is! While for patients this may seem simply to be even, white teeth, a number of different factors are involved and they must all be understood and taken into account in order to provide optimal smile aesthetics.

This paper investigates two components that have hitherto received little research: maxillary incisal edge embrasure space and interproximal contact area. Aesthetic proportions and relationships have been suggested for both these variables, but little evidence exists either to support or refute them, making this article an important contribution to the literature. In addition, what sets this paper apart is the authors' inclusion of dental technicians among the par-

ticipants in the study. As stated in the paper, technicians are integral to the process of providing a successful aesthetic outcome when prosthodontics are provided and optimal communication between the patient, the dentist and the technician is vital for the success of the final restoration.

The results of the study show that for embrasure space, the 'ideal' scenario, where the spaces increase in size and volume the further back in the arch that the teeth are positioned, was considered most attractive, followed by the scenario with equal, minimal embrasure spacing. For interproximal contact area, the 'equal' scenario was considered most attractive, closely followed by the 'ideal' relationship. No significant differences were found between the perceptions of patients, dentists and technicians for interproximal contact area, but a significant difference was found between patients' and dentists' perceptions of

incisal edge embrasure space, with dentists preferring the 'ideal' arrangement and patients preferring the 'equal' one. This highlights the importance of good communication between patient and dentist to ensure that any pre-conceived ideas on the part of the dentist do not affect the patient's satisfaction with the end result.

This paper provides useful data on perceptions of two aspects of smile aesthetics, and the methodology used has the potential to be extended to investigate other contributing factors. Such work would form a valuable contribution to the somewhat patchy literature in this area.

The full paper can be accessed from the *BDJ* website (www.bdj.co.uk), under 'Research' in the table of contents for Volume 209 issue 3.

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IN BRIEF

- Many factors contribute to determine the aesthetics of a smile.
- This study sought to find the opinions of patients, dentists and dental technicians on what constituted the most aesthetically pleasing embrasure space and interproximal contact area.
- An embrasure space arrangement where the size of the embrasures increases progressively distally from the midline was deemed most attractive.

COMMENT

This elegant study will be of interest to many clinicians and technicians who are involved in carrying out restorative and orthodontic treatment. Increasingly patients seek dental treatment in order to improve their dentofacial appearance, and it is important for the dentist-patient relationship that realistic aesthetic expectations are met. However, many of the available aesthetic clinical and technical guidelines are based on anecdotal or accepted professional opinion rather than robust scientific evidence.

Due to the large number of potential variations in the morphology and arrangement of the anterior dentition, carrying out the scientific studies needed to establish an evidence base is difficult and complex. Nevertheless, some recent studies, including this paper by Foulger and colleagues, have scientifically examined the influence of specific variations in individual features of the anterior dentition, including midline relationships, the amount of gingival display, and the colour and shape of the teeth. The current study uses an elegant and robust design with a standardised photograph being modified and rated by three groups of judges: dentists, technicians and patients. By modifying only single features within a smile image and recording differences in the perceptions of relative attractiveness, this type of study design makes meaningful statistical analysis and interpretation of such subtle changes possible. The results are interesting in that there

were differences between the findings and some of the accepted aesthetic guidelines previously proposed in the literature, in particular for the contact area ratios between the upper incisors and canines.

The current study and some of the previous studies have also explored whether patients' opinions of dentofacial appearance differ from those of dental professionals. Any such differences would be important to consider during the discussion and consent processes when planning aesthetic changes with patients. Reassuringly, patient preferences in this study were very similar to those of the dentists and technicians, although there was some evidence that dentists were more critical. The findings further emphasise how useful such well designed scientific studies are in helping to design clinical aesthetic guidelines, although these should always be viewed and applied in the context of the art of dentistry as well as the science.

C. Johnston,
Consultant Orthodontist/Senior Lecturer
School of Medicine,
Dentistry and Biomedical Sciences,
Queen's University Belfast & Belfast
Health and Social Care Trust

AUTHOR QUESTIONS AND ANSWERS**1. Why did you undertake this research?**

Much is written in the dental literature about smile design and anterior aesthetics, but little research exists to support what is commonly accepted as being 'ideal'. Two such important factors, which have received previous assertions as to what is ideal, but are substantiated by no evidence base, are maxillary incisal edge embrasure spaces and interproximal contact area dimensions. The increasing demand by patients for treatment based on perceived aesthetic need rather than on restoration of masticatory function demands evidence-based research to support what are accepted wisdoms amongst the profession. Ascertaining whether dentists', technicians' and patients' perceptions of what is ideal in relation to these particular components of anterior aesthetics are broadly similar should aid communication between these groups when designing and providing improvements to a patient's appearance.

2. What would you like to do next in this area to follow on from this work?

As highlighted by the introduction, some aspects of anterior dental aesthetics have received more attention than others, and the quality of the research is variable. Further studies using the same baseline photograph, examining alternative variations of individual aspects of anterior dental aesthetics, would produce a valuable body of evidence to support smile design. Studies looking into the effects of (midline) asymmetry, altered position of the gingival aesthetic line (GAL) and the gingival margin discrepancies all have merit.