Dental Appearance and Personality Trait Judgment of Elderly Persons

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Purpose: The study aimed to investigate the personality judgments made by observers of elderly individuals with different dental appearances. ***Materials and Methods:*** A random sample of 120 elderly (57 men, 63 women; third age: n = 51, mean age: 68.6 ± 5.0 years; fourth age: n = 69, mean age: 85.8 ± 3.0 years) and 120 young (54 men, 66 women; mean age: 24.9 ± 3.5 years) subjects were included. Decayed, natural, and ideal dental appearances were simulated on photographs of an elderly man and woman. Participants were asked to judge the personality traits of two randomly selected photographs. Univariate and multivariate analyses were performed. ***Results:*** Both groups judged the photographs similarly by attributing a higher social class to the individuals with an ideal dental appearance (elderly group: $P = .0295$ for the male subject, $P = .0420$ for the female subject; young group: $P = .0003$ for the male subject, $P = .0042$ for the female subject). This difference was less obvious when only the third-age participants were analyzed; they attributed a higher social class to the photograph of the man with a natural dental appearance than to the man with decayed and ideal appearances ($P = .0322$ and $P = .0092$, respectively) and lower intellectual capacities to the woman with a decayed appearance ($P = .0351$). The fourth-age subgroup made no such distinction. ***Conclusions:*** Personality judgments made by young and elderly persons are influenced by dental appearance. However, in the very old subgroup, no such influence could be verified. Dental esthetics should not be neglected in dental care for elderly patients. *Int J Prosthodont 2014;27:348–354. doi: 10.11607/ijp.3813*

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An individual's facial appearance plays a key role in an observer's perception of personality, intellect, social background, and financial and mental status.[1,2] Specifically, dental appearance is often the first quality to be assessed by an onlooker during personal interactions[3] in both social and professional circumstances.[4,5] Observers tend to be influenced by visible signs of an unhealthy dental status, and such an appearance may even lead to an individual's social exclusion, loss of employment opportunities, or loss of educational opportunities.[6,7] In contrast, individuals with pleasing dental appearances tend to earn more financially, foster better professional opportunities, and achieve more professional success.[5,8,9] Overall, initial negative perceptions are said to be common of individuals with a poor dental appearance.[3,10]

The perceptions and attitudes of elderly individuals may be different from those of younger people; with increased age, natural dental appearance deviates from a typical ideal.[11,12] Elderly individuals may have different values and priorities. Their attitudes also may differ based on personal dental experiences such as tooth loss and denture wearing. In fragile, elderly people, there may be a shift in priorities and attitudes due to multi-morbidity and/or functional impairment.

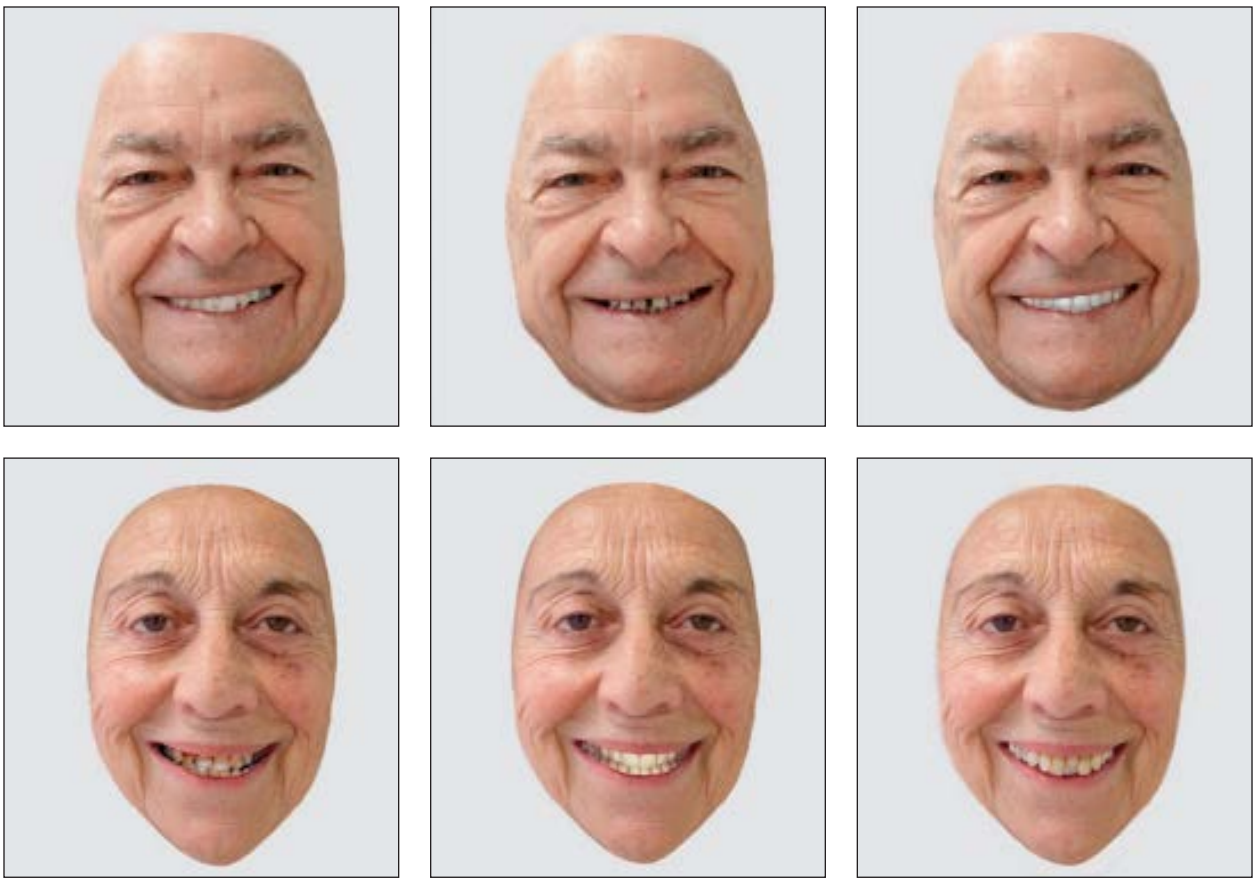

Fig 1 Digitally altered photographs of elderly male and female subjects to demonstrate decayed, natural, and ideal dental appearances.

Little is known about the judgments of others of elderly people based on their general and dental appearances. Therefore, the aim of this survey was to investigate the personality judgments made by onlookers of photographs of elderly persons with simulated decayed, natural, or ideal dental appearances and to relate the findings to the onlookers' age, sex, and background. The null hypothesis was that dental appearance has no influence on an onlooker's judgment of an elderly person's personality traits.

Table 1 Inclusion and Exclusion Criteria

Inclusion criteria
Resident of the state (canton) of Geneva, Switzerland
Young group: 20 to 30 years old
Elderly group: ≥ 60 years old
Exclusion criteria
Severe cognitive impairment
Not fluent in French or English
Severe visual impairment
Secondary exclusion criteria
Repeated failure to attend the interview

Materials and Methods

This study was approved by the ethical committee of the University Hospitals of Geneva, Switzerland (CEREH no. 06-052).

Study Group

A population list of 4,802 eligible inhabitants was obtained from the Office Cantonal de la Population, Geneva, Switzerland. The inclusion and exclusion criteria are listed in Table 1. Two groups were recruited: young (age: 20 to 30 years) and old (age: ≥ 60 years) participants; the latter were further subdivided into third- (age: 60 to 79 years) and fourth- (age: ≥ 80 years) age groups. The sampling strategy adopted for this study was a quota sample.

Photograph Morphing

Full-face color photographs of an elderly man and woman were obtained. The original images were morphed using Adobe Photoshop (version 6.0, Adobe), and all features indicating the subject's social context were removed.[3,13,14] Decayed, natural, and ideal dental appearances were simulated. Thus, a total of six photographs (one man and one woman with three dental appearances each) were obtained (Fig 1).

Table 2 Demographics of the Study Groups

	No. of participants						
Group	Male	Female	Total	Age (mean ± SD)	MMSE (mean ± SD)	SF-12 (mean ± SD)	IADL (mean ± SD)
Young	54	66	120	24.9 ± 3.5 y	–	–	–
Third age	24	27	51	68.6 ± 5.0 y	28.7 ± 1.1	31.5 ± 2.8	6.7 ± 2.6
Fourth age	33	36	69	85.8 ± 3.0 y	27.1 ± 2.8	31.2 ± 2.7	7.5 ± 2.3
Total	111	129	240	51.7 ± 27.8 y	27.8 ± 2.4	31.3 ± 2.7	7.2 ± 2.4
Comparison*	NS			.0004	.0833	.5388	

MMSE = Mini Mental State Exam; SF-12 = Short Form Health Survey; IADL = Instrumental Activities of Daily Living; NS = not significant.
*Unpaired *t* test.

Protocol

A formal letter of intent was sent to all prospective participants. One week later, the candidates were telephoned to confirm their willingness to participate in the survey. Each participant was individually interviewed in a convenient public place or at the participant's home. Written informed consent was obtained. Relevant demographics as well as the Short Form Health Survey (SF-12),[15] Mini Mental State Exam (MMSE),[16] and Instrumental Activities of Daily Living Scale (IADL)[17] scores were gathered. The participants were then presented with a randomly selected male and female photograph and instructed to judge the personality traits of the person in each photograph (n = 40 total ratings for each photograph). At this point, the participants were still blinded to the dental nature of the study. The personality traits to be judged covered four domains, each with three distinct personal characteristics:

- Social traits: likeable, communicative, sociable
- Intelligence: intelligent, quick-witted/sharp, creative
- Psychosocial traits: happy, self-confident, serene
- Social class: wealthy, privileged, influential

A 5-point Likert scale that asked the participants to judge whether the personality characteristics applied to the person in the photograph not at all, little, moderately, very, or extremely was used. Each interview lasted between 45 and 140 minutes and covered further questionnaires. Finally, the dental nature of the study was revealed, and participants underwent a short visual dental examination.

Statistical Analysis

Univariate and multiple linear regression analyses were performed to study the effects of age, sex, and background. The Fischer's test for categorical or binary variables was used, and a Mann-Whitney test was performed to compare non-Gaussian continuous ordinal variables. A Kruskal-Wallis test was used for the comparison of more than two groups. The Bonferroni correction was applied for multiple comparisons. Correlation analyses were performed using Spearman correlation coefficients. All analyses were performed with Stata (version 10.0, Stata) and Statview (version 5.0, SAS).

Results

A total of 1,340 letters were sent in alphabetical order until 120 elderly and 120 young participants who fulfilled the inclusion criteria agreed to participate.

Study Group

The elderly (57 men, 63 women; mean age: 78.5 ± 9.4 years) and young (54 men, 66 women; mean age: 24.9 ± 3.5 years) groups comprised 120 participants each. The elderly group was subdivided into third-age (n = 51; mean age: 68.6 ± 5.0 years) and fourth-age subgroups (n = 69; mean age: 85.8 ± 3.0 years; Table 2).

Demographics

The elderly group's MMSE scores were above 26 in 84% of the participants (n = 99); however, this score was significantly lower and more variable in the fourth-age subgroup (P = .0007; Mann-Whitney). The SF-12 revealed that 31.4% of the elderly participants were in good health, whereas 68.6% were below average. Only 20.3% of the elderly participants had received education at the university level (Table 3). More than 65% of the elderly participants were physically independent. Sixteen elderly participants (13.3%) resided in long-term care facilities and demonstrated significantly higher IADL scores. Approximately half (52.6%) reported an average income. Three percent of elderly participants showed a good dental appearance, whereas 84% presented an average dental appearance, and 13% a poor dental appearance. The majority of the participants in the young group (91.7%)

Table 3 Educational Background of the Study Groups

Group	University level (n)	Non-university level (n)	Intragroup comparison†
Young	38	82	$P = .0004$*
Third age	11	34	$P = .9413$
Fourth age	13	49	$P = .8131$
Total	62	165	$P = .2398$
Intergroup comparison†			
Young vs third age	$P < .0001$*	$P < .0001$*	
Young vs fourth age	$P < .0001$*	$P < .0001$*	
Third age vs fourth age	$P < .0001$*	$P < .0001$*	

*Statistically significant.
†Unpaired *t* test.

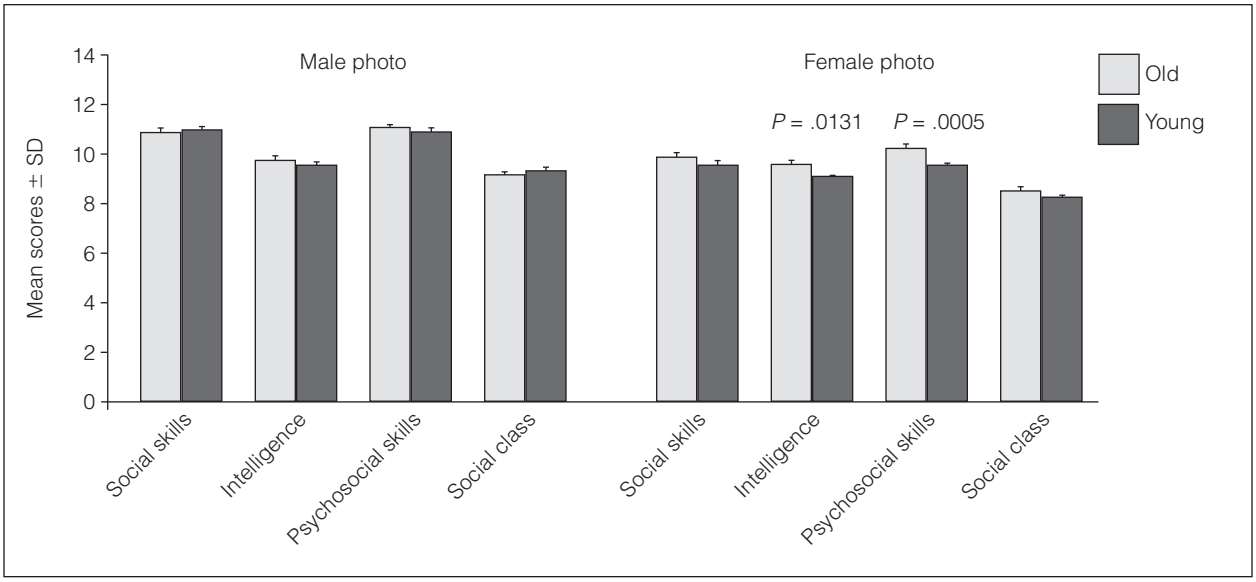

Fig 2 Judgments of the male and female photographs. Similar judgments were made by the two age groups. Significant differences were observed only in the intelligence and psychosocial skills categories for the photograph of the woman.

had undergone orthodontic therapy; hence, their natural dentition had mostly an ideal appearance. The presence of a removable prosthesis was confirmed in 49.6% of the elderly participants and none present in of the young participants.

Judgment of Personality Traits

The judgments of the old and young groups were strikingly similar for all photographs evaluated (Fig 2); however, the young group rated the female subject less favorably in terms of intelligence ($P = .0131$) and psychosocial skills ($P = .0005$). Interestingly, female participants attributed high social skills ($P = .0180$; Mann-Whitney) and intelligence ($P = .0480$; Mann-Whitney) to the photograph of the elderly man. The participants' physical autonomy, sex, level of education, mental status, and social class had no significant influence on the judgments.

In both the old and young participants, dental appearance significantly influenced their judgments of social status, with the photographs showing the decayed dental appearance being judged lowest and those showing the ideal appearance being judged highest (elderly group: $P = .0295$ for the male subject, $P = .0420$ for the female subject; young group: $P = .0003$ for the male subject, $P = .0042$ for the female subject; Kruskal-Wallis). However, when splitting the elderly participants into third- and fourth-age subgroups, the influence of dental appearance on the participants' judgments of social class for the photographs of the elderly man was not significant

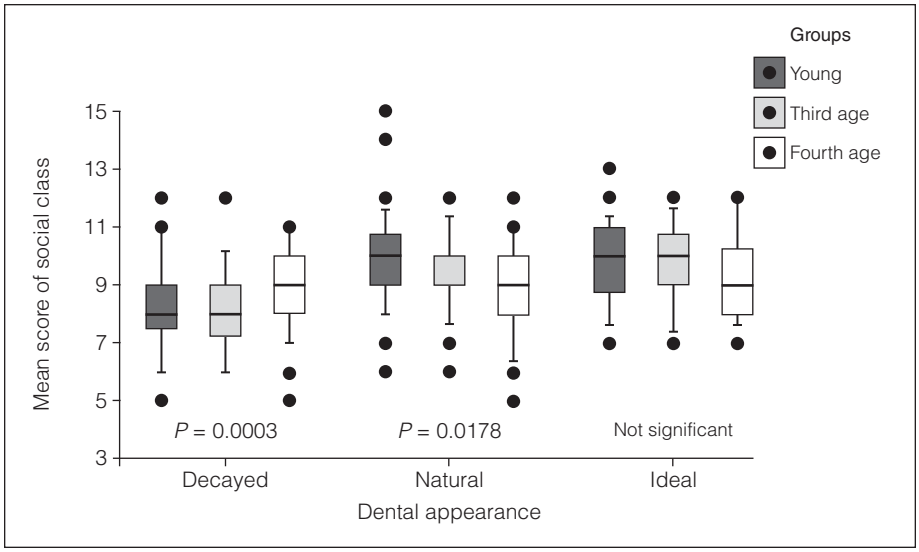

Fig 3 Boxplot showing the judgments of social class for the male photographs.

(P = .4576; Kruskal-Wallis). As opposed to the fourth-age subgroup, the third-age subgroup still judged the social class for the male subject significantly higher (Fig 3) according to dental appearance (natural = 9.3, decayed = 8.2, ideal = 9.7; P = .0178). For the female subject, the third-age group associated the decayed dental appearance with lower intellectual capacity compared with the natural appearance (decayed = 8.9, natural = 10.1; P = .0351). Again, the fourth-age subgroup made no significant distinction between the two conditions (decayed = 9.2, natural = 9.2). The third-age subgroup attributed better intellectual skills to the man with a natural dental appearance (decayed = 9.5, natural = 10.4), but the difference was not statistically significant.

The judgments of the other personality traits, social competence, and psychosocial competence were less conclusive and mostly nonsignificant according to univariate and multivariate analyses.

Discussion

Previous studies have assessed the impact of an attractive facial appearance on social and professional circumstances[18]; however, only a few have related those effects to dental appearance.[3,5,10,19] To the current authors' knowledge, the present study is the first to include an aged population.

Certain methodologic weaknesses must be considered when interpreting the results. First, the sampling strategy adopted for this study was a quota or nonprobability sampling in which only age was used as a selection criterion. Quota samples are adequate when studying the relationships between variables, as in this study. However, sample bias may be higher with this method compared to other assessment methods.[20]

Second, the use of photographs of only two individuals may present another limitation. Although this approach provides some level of experimental control, use of only one man and one woman may have limited the external validity. Notably, ethnicity or age confounds may have been influential factors. Using multiple photographs of older adults with slightly different facial features would have likely augmented the outcome of this study. Further, the simulated dental appearances in the photographs of the man and the woman were not uniform. Although the photographs were neutralized as much as possible by removing hair and clothing, it cannot be excluded that other facial features (eg, body weight or makeup) could have influenced viewers' perceptions. Nevertheless, altered photographs of the face have been systematically used in previous studies to assess psychosocial characteristics,[3,7,21–23] dental appearance,[22–25] and smile esthetics.[26]

Third, the MMSE and IADL tests were omitted in the young participants' interviews since cognitive impairment and restrictions in the activities of daily living were visibly absent. As a result, the interview time was shorter for this group, which means fatigue played a lesser role.[18,27]

Finally, cognitive impairment and visual acuity may have influenced the judgments of the fourth-age participants. The results for the fourth-age subgroup

were contradictory to the results for comparison of the entire group of elderly participants. Separation of the subgroups for comparison with the young participants would have led to smaller sample sizes and weakened the power of the results.

In a previous study, photographs of girls were judged more favorably than those of boys.[3] Shaw and Humphreys reported contradictory findings on this issue over the course of their research.[7] In the present study, differences in personality judgments were found between the photographs of the man and the woman. The female participants attributed higher social skills and intelligence to the man's photographs. The woman's photographs were rated lower in intelligence and psychosocial skills by the young participants.

An ideal dental appearance positively influenced the younger participants, who attributed a higher social class and intellect to those images. Interestingly, this result was similar in the elderly group, which stresses the undiminished importance of dental esthetics in elderly patients. The importance of attractive teeth was an essential element in the participants' judgments, which is in agreement with previous studies of younger subjects.[28] Vallittu et al reported that elderly subjects did not place as much importance on the appearance of their own teeth as did younger people.[29] This is in agreement with other studies showing that younger people are more concerned about their dental appearance than elderly people.[3,4,30] The present results partly contradict such reports; participants in the third-age subgroup were influenced by dental appearance. However, it should be noted that this survey examined the dental appearance of others rather than of the interviewees themselves.

Predictably, the young group judged the woman with the decayed dental appearance as less intellectual and less socially competent. The elderly group as a whole attributed less intelligence and social class to the woman with a decayed appearance. Interestingly, neither group made such discriminations when viewing the photographs of the man. This finding shows the importance of dental esthetics particularly in elderly women as a factor for preventing social exclusion or bias.

The dominant factor influencing the participants' judgment was very old age. The young and third-age participants formed similar judgments of intellect and social standing, but the judgments of the fourth-age subgroup seemed independent of the dental appearance. This distinction between the judgments of the third- and fourth-age participants should be meaningfully interpreted. With advanced age, cognitive impairment and morbidity tend to increase, and a generally more accepting attitude in old age may lead to less concern for dental esthetics. In contrast, the third-age group may have considered appearance to be an important part of self-esteem, social interactions, professional success, and a healthy social life. Most of the third-age participants were still employed and in good health with an active social life. This may have influenced their social judgments. Another aspect of dental appearance that may have influenced the judgments regarding social class is that restorative and esthetic dental procedures are typically expensive. This knowledge may have subconsciously influenced the observers to regard healthy dentition as associated with a higher socioeconomic standing. In Switzerland, dental care is not included in the general health insurance; it would be interesting to repeat this study in a country where dental care is covered by general health insurance.

Conclusions

Within the limitations of this study, it may be concluded that dental appearance played an integral role in viewers' judgments of photographs of elderly individuals. Thus, the null hypothesis was rejected. However, in participants with a very old age, dental appearance had a less obvious influence on their personality judgments. Dental clinicians should provide an age-appropriate dental appearance for elderly patients to prevent social exclusion or bias in social and professional settings.

Acknowledgments

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References

1. Jenny J, Proshek JM. Visibility and prestige of occupations and the importance of dental appearance. J Can Dent Assoc 1986;52:987–989.
2. Jeremiah HG, Bister D, Newton JT. Social perceptions of adults wearing orthodontic appliances: A cross-sectional study. Eur J Orthod 2011;33:476–482.
3. Newton JT, Prabhu N, Robinson PG. The impact of dental appearance on the appraisal of personal characteristics. Int J Prosthodont 2003;16:429–434.
4. Kavand G, Broffitt B, Levy SM, Warren JJ. Comparison of dental esthetic perceptions of young adolescents and their parents. J Public Health Dent 2012;72:164–171.
5. Linn EL. Social meanings of dental appearance. J Health Hum Behav 1966;7:289–295.

6. Shaw WC. The influence of children's dentofacial appearance on their social attractiveness as judged by peers and lay adults. Am J Orthod 1981;79:399–415.
7. Shaw WC, Humphreys S. Influence of children's dentofacial appearance on teacher expectations. Community Dent Oral Epidemiol 1982;10:313–319.
8. Langlois JH, Kalakanis L, Rubenstein AJ, Larson A, Hallam M, Smoot M. Maxims or myths of beauty? A meta-analytic and theoretical review. Psychol Bull 2000;126:390–423.
9. Lawton MP, Brody EM. Assessment of older people: Self-maintaining and instrumental activities of daily living. Gerontologist 1969;9:179–186.
10. Klages U, Claus N, Wehrbein H, Zentner A. Development of a questionnaire for assessment of the psychosocial impact of dental aesthetics in young adults. Eur J Orthod 2006;28:103–111.
11. Carlsson GE, Wagner IV, Odman P, et al. An international comparative multicenter study of assessment of dental appearance using computer-aided image manipulation. Int J Prosthodont 1998;11:246–254.
12. Alkhatib MN, Holt R, Bedi R. Age and perception of dental appearance and tooth colour. Gerodontology 2005;22:32–36.
13. Shaw WC, Rees G, Dawe M, Charles CR. The influence of dentofacial appearance on the social attractiveness of young adults. Am J Orthod 1985;87:21–26.
14. Wagner IV, Carlsson GE, Ekstrand K, Odman P, Schneider N. A comparative study of assessment of dental appearance by dentists, dental technicians, and laymen using computer-aided image manipulation. J Esthet Dent 1996;8:199–205.
15. Cons NC, Jenny J, Kohout FJ, Freer TJ, Eismann D. Perceptions of occlusal conditions in Australia, the German Democratic Republic and the United States of America. Int Dent J 1983;33:200–206.
16. Folstein MF, Folstein SE, McHugh PR. "Mini-mental state." A practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res 1975;12:189–198.
17. Dion K, Berscheid E, Walster E. What is beautiful is good. J Pers Soc Psychol 1972;24:285–290.
18. Asch SE. Forming impressions of personality. J Abnorm Psychol 1946;41:258–290.
19. Feng XP, Newton JT, Robinson PG. The impact of dental appearance on perceptions of personal characteristics among Chinese people in the United Kingdom. Int Dent J 2001;51:282–286.
20. Mattejat F, Hirsch O, Remschmidt H. Value of telephone interview for quality assurance and therapy evaluation in child and adolescent psychiatry. Review of the literature and empirical results of participation quota and possible sampling bias [in German]. Z Kinder Jugendpsychiatr Psychother 2003;31:17–34.
21. Tedesco LA, Albino JE, Cunat JJ, Slakter MJ, Waltz KJ. A dental-facial attractiveness scale. Part II. Consistency of perception. Am J Orthod 1983;83:44–46.
22. Jiang F, Blanz V, O'Toole AJ. Probing the visual representation of faces with adaptation: A view from the other side of the mean. Psychol Sci 2006;17:493–500.
23. Tedesco LA, Albino JE, Cunat JJ, Green LJ, Lewis EA, Slakter MJ. A dental-facial attractiveness scale. Part I. Reliability and validity. Am J Orthod 1983;83:38–43.
24. Evans R, Shaw W. Preliminary evaluation of an illustrated scale for rating dental attractiveness. Eur J Orthod 1987;9:314–318.
25. Marunick MT, Chamberlain BB, Robinson CA. Denture aesthetics: An evaluation of laymen's preferences. J Oral Rehabil 1983;10:399–406.
26. Tjan AH, Miller GD, The JG. Some esthetic factors in a smile. J Prosthet Dent 1984;51:24–28.
27. Tajfel H. Quantitative judgement in social perception. Br J Psychol 1959;50:16–29.
28. Kerosuo H, Hausen H, Laine T, Shaw WC. The influence of incisal malocclusion on the social attractiveness of young adults in Finland. Eur J Orthod 1995;17:505–512.
29. Vallittu PK, Vallittu AS, Lassila VP. Dental aesthetics—A survey of attitudes in different groups of patients. J Dent 1996;24:335–338.
30. Graber LW, Lucker GW. Dental esthetic self-evaluation and satisfaction. Am J Orthod 1980;77:163–173.

Literature Abstract

Retained asymptomatic third molars and risk for second molar pathology

This cross-sectional and longitudinal study investigated the association of retained asymptomatic third molars with risk of adjacent second molar pathology (eg, caries and/or periodontitis) based on third molar status (ie, absent, erupted, or unerupted). Data of distal caries, distal alveolar bone loss ≥ 20%, and distal probing depth > 4 mm from 416 adult US men were selected from an observational cohort study. Compared to second molars adjacent to absent third molars, results showed the following: *(1)* those second molars adjacent to erupted third molars were more likely to have distal caries, *(2)* those second molars adjacent to soft tissue impacted third molars were more likely to have distal bone loss ≥ 20% and distal probing depth > 4 mm, *(3)* and those second molars adjacent to bony impacted third molars were more likely to have distal bone loss ≥ 20%. In an analysis conducted using incidence of any one of the three disease outcomes in adjacent second molars, those that were adjacent to soft tissue impacted third molars were at highest risk as well as eventual tooth loss, followed by those adjacent to bony impacted or erupted third molars. The authors concluded that the retention of third molars is associated with increased risk of second molar pathology in middle-aged and older adult men.

Nunn ME, Fish MD, Garcia RI, Kaye EK, Figueroa R, Gohel A, Ito M, Lee HJ, Williams DE, and Miyamoto T. *J Dent Res* 2013;92:1095–1099. **References:** 21. **Reprints and Email:** nunn@creighton.edu—*Huong Nguyen, Ann Arbor, Michigan, USA*