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Self-rating of satisfaction with dental appearance in an elderly German population

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Objective: To assess data on satisfaction with dental appearance in old age. **Design:** Cross-sectional study of an elderly non-patient group born from 1930 to 1932. **Setting:** Two urban regions of Germany. **Participants:** 225 subjects (73-75 years, 49.3% male). **Methods:** A questionnaire was completed. Descriptive analysis and bivariate analysis of gender differences, and a regression model for multivariate analysis were performed. **Main outcomes:** Satisfaction with overall dental appearance, tooth/denture colour, shape, and position, and importance of dental appearance to overall appearance. **Results:** Importance of dental appearance to overall appearance was rated high (7.5 ± 2.0 , where 10 denotes most important), as was overall satisfaction with dental appearance (7.2 ± 1.8 , where 10 denotes best possible). Up to 12% were not at all satisfied with tooth/denture colour, shape, or position, however. Women were more critical when judging overall satisfaction with dental appearance ($p=0.02$). A significant positive association was obtained between overall dental appearance and position of teeth ($p<0.001$). **Conclusions:** Satisfaction with dental appearance was high, as was the importance of dental appearance to elderly patients. Both aesthetic and functional aspects should therefore receive special attention in dental treatment. In this context the position of teeth should be regarded as of special importance.

Key words: Dental appearance, aesthetics, tooth position, dentures

Dental appearance, one of the most important aspects of facial attractiveness, encompasses not only tooth colour but also the position and shape of teeth, and related aspects, for example black holes between teeth and the visibility of gums while smiling¹⁻². Previous studies have revealed the importance of dental appearance in many everyday situations³. It has been shown that even others' judgment of individual personal characteristics is affected by dental appearance^{4,5}. Dental aesthetics have also been found to be correlated with quality of life⁶. In self-rating their dental appearance some members of all age groups, ranging from adolescents to the elderly, are dissatisfied⁷⁻⁹. For example, a study of over 3,300 participants in the UK revealed that 15.1% in the age

group 16-34 years, 15.5% in the age group 35-54 years, and 12.1% in the age group 55+ years were dissatisfied with their dental appearance⁸.

In the industrialised countries the proportion of the elderly in society will grow substantially; the specific characteristics of this group are of major interest now, and this will continue in the future¹⁰. It has already been shown that concerns about dental appearance are greatest in middle age and of decreasing priority in old age^{8,9,11}. Thus, in daily practice, even though some dissatisfaction occurs in the elderly it is often supposed the elderly no longer have great expectations of their dental appearance and this aspect in treatment is often regarded as of no special importance. Western socie-

ties, however, are increasingly youth-orientated, and the benefits of youthfulness, including physical appearance, are desirable¹². It is likely that forthcoming groups of elderly will have different opinions about aesthetics and appearance compared with the past, and this will possibly affect attitudes toward dental appearance and attractiveness.

Representative data on the satisfaction with dental appearance are therefore needed to enable the dental treatment of the growing 'new' group of elderly to be addressed. The objective of this study was to assess the first data on self-reported satisfaction with dental appearance, and its effect on overall attractiveness, for elderly people in Germany. As the current literature also lacks information about which aspect; colour, shape, or position of teeth has the largest effect on satisfaction with dental appearance, this was also investigated.

Materials and methods

Design, setting, and participants

All subjects were recruited from the interdisciplinary longitudinal study of adult development (ILSE) which was conducted in two urban regions in Germany, one located in the south west and one in eastern Germany. The ILSE study comprises two age cohorts, one born from 1930 to 1932 and the other born from 1950 to 1952¹³. The data were collected during the third ILSE measurement, which included dental examination for the first time. In this cross-sectional report the older cohort was included; the participants were from 73 to 75 years of age on examination and underwent psychological, medical and dental examination and were asked to complete a questionnaire at the clinic or, in a few cases, because of the immobility of the participant, at home. The dental aesthetic questionnaire especially was completed face-to-face with the examiner. The study was approved by the local university review board and all participants gave written informed consent.

Main outcome

Subjects were asked to assess their satisfaction with the colour, shape, and position of their natural and/or artificial teeth (fixed and removable dentures) on a three-point Likert-type scale with possible answers 'not at all satisfied', 'moderately satisfied', or 'completely satisfied'¹⁴. The presence or absence of artificial denture teeth was self-reported. They also assessed their global satisfaction with their dental appearance on a ten-point scale with possible answers 1='not at all satisfied' to 10='completely satisfied'. They also stated whether dental appearance was 1='not at all important' to 10='very important' to overall attractiveness/appearance. To judge their wish to have lighter teeth they also rated whether lighter teeth would increase their quality of life 'not at all', 'slightly', or 'substantially'.

Psychological well-being was measured using the 17-item German version of the revised standardised Philadelphia Geriatric Center Morale Scale (PGCMS)¹⁵. Three factors represent the dimensions of psychological well-being: agitation, attitude toward their own ageing, and dissatisfaction with loneliness. The participants could answer 'Yes' or 'No' to each item. Data were encoded so that each high-satisfaction response received a score of '2' and each low-satisfaction response was scored '1', so total score ranged from 17 to 34. The items were scored so that a higher value indicated a higher level of psychological well-being. Income as a social class indicator was judged, starting from no own income up to €3000 (Euro) per month or more. Education was recorded by summing years of school education, professional education and other studies.

Statistical analysis

Descriptive analysis was performed for all variables. Gender differences were estimated using the chi-squared test or U-test, where appropriate. A multiple linear regression model with the backward-elimination method was used to assess the strength of the variables 'colour of own teeth or denture teeth', 'shape of own teeth or denture teeth', and 'position of teeth' in global satisfaction with dental appearance. As socio-economic variables 'gender', 'education', 'income', 'eastern/western Germany', and 'psychological well-being' were also included in the model. The independent variables were dummy-coded for analysis. Subjects with missing values for any variables were reported and, for the regression model, pair-wise exclusion of cases was used. The level of significance was set to $\alpha < 0.05$. All statistical analysis was performed using SPSS 12.0.1 (SPSS Inc. Chicago, USA).

Results

Three-hundred and fourteen ILSE participants were contacted for examination and in 225 (72%) cases dental aesthetic questionnaires were collected. Of these, 111 (49.3%) were male. One-hundred and ninety-nine (88.4%) participants reported they had own natural teeth remaining, and 210 (93.3%) reported they had artificial teeth including fixed or removable dentures. The mean PGCMS-sum score was 28.5 (SD 3.9; range 17 to 34). The mean number of years of education of the participants was 13.1 (8 to 18). Mean income was approximately €1400 per month.

The overall rating of satisfaction with dental appearance was high, a mean of 7.23, where 10 was the best possible, with a significant difference between men and women ($p=0.021$; *Table 1*). The importance of dental appearance to overall appearance was also rated high, with a mean of 7.47 on a scale on which 10 was most important, indicating the significant importance of den-

tal appearance to overall appearance, with no difference between men and women ($p=0.75$; *Table 1*).

Most of the subjects were also completely satisfied with the colour and shape of their own teeth and denture teeth, and with the position of their teeth (>68% in every rating, *Table 2*). They were more critical of their own teeth than of denture teeth. For every rating, however, some subjects were 'not at all satisfied', up to 12% for shape of natural teeth and positioning of teeth. No significant gender differences were found for colour of denture teeth, $p=0.118$, shape of own teeth, $p=0.679$, shape of denture teeth, $p=0.566$, or position of teeth $p=0.193$. A significant difference, $p=0.020$, was found for rating the colour of own teeth.

Of the male subjects ($n=110$, $n=1$ missing), 82.7% ($n=91$) had the opinion lighter teeth would not improve their quality of life (QoL) and 14.5% ($n=16$) believed lighter teeth would slightly improve their QoL. Three of the male subjects (2.7%) believed lighter teeth would lead to substantially improved QoL. Of the women ($n=113$, $n=1$ missing), 76.1% ($n=86$) did not believe their QoL would be improved by lighter teeth, 19.5% ($n=22$) thought it would lead to slight improvement, and 4.4% ($n=5$) thought it would lead to great improvement. The differences between women and men were not statistically significant ($p=0.461$).

The regression model using rating of overall satisfaction with dental appearance as dependent variable showed that this rating was only significantly positively associated with the position of the teeth (*Table 3*). All other dental and social-economic variables were removed earlier from the model; in the last step of the backward elimination process the variable 'satisfaction with colour of denture teeth' ($p=0.157$) was removed. The final model could explain 18% of the variance in the rating of overall satisfaction with dental appearance (corrected $R^2=0.18$).

Discussion

Participants

For the first measurement in the ILSE study the sample was selected as representative of the German population in the respective age groups, but not for gender¹³. This was because ILSE was planned as a longitudinal study and a higher proportion of male subjects were therefore recruited. The representative nature of ILSE could have been violated in the second and third measurements; in particular, the response of better-educated subjects was better than for those with a lower level of education. However, the ILSE study is conducted in an age group in which most individuals were wearing either fixed or removable dentures and were, because of increasing life expectancy, a growing group of potential patients with partially or completely removable dentures (RD) or extended fixed partial dentures (FD); the sample was

therefore regarded as suitable for exploring the research hypothesis of this manuscript. Over 59% of the German population between 65 and 74 years of age wear removable partial dentures¹⁶. On the other hand, the narrow age range limits the applicability of the results to other groups of elderly, for example the young elderly or the very old; this should be matter of future research.

The developed questionnaire focused on major aspects of dental appearance. It would have been possible to obtain more detailed information, as Wolfarth *et al.*¹⁷ did by developing and validating a questionnaire with 14 items. This includes additional aspects, for example length of teeth, visibility of gums, and harmony of tooth widths and midline. Bearing in mind the age of the study population, the practical meaning of the results for the elderly patient, and time constraints with the ILSE setting in mind, only global features of dental appearance were assessed. The structure of the questionnaire on dental appearance was comparable with that used in other studies, with Likert-type or dichotomy answering possibilities for global questions on satisfaction^{7,8}. A criticism of the questionnaire used is, however, the lack of its reliability and validity assessment.

The results of this study demonstrate the level of satisfaction with dental appearance of the group examined, for dental care providers, and enable comparison of individual patient satisfaction. Although some of the elderly were not at all satisfied with their dental appearance, a high level of satisfaction with dental appearance was found, with a mean rating of 7.3 of a best possible 10. Most of the elderly were completely satisfied with the colour, shape, and positioning of their own teeth and denture teeth. This could be seen as confirmation of results of studies conducted in other nations. In the UK, 80.3% of the 55+ population were satisfied with their dental appearance and 71.1% were satisfied with their tooth colour⁸. The Florida Dental Care Study revealed that 24% of the study population (45 years of age and older) were very satisfied and 52% were satisfied with their dental appearance⁹.

The ratings for colour and shape of dentures were even higher for denture teeth. One possible explanation might be that patients could affect the aesthetic outcome of their dentures during the fabrication process; they therefore tend to judge the work they co-determined, and paid for, with high ratings. The results give practical information for helping to adapt dental treatment to RD and extended FD patients. The importance of co-operation between dentist and patient is emphasised by previous studies which showed important disagreement between ratings of attractiveness assessed by dentists and patients^{18,19}. Results from multivariate analysis of overall satisfaction with dental appearance revealed that positioning of teeth should receive special attention in denture fabrication. Socio-economic and psychological variables which were supposed to affect dental appearance rating were also included in the multivariate analysis;

Table 1 Mean, standard deviation (SD), and percentile distribution of ratings of satisfaction with dental appearance and importance of dental appearance to overall appearance (n=224, n=1 missing).

Rating percentile	Satisfaction with dental appearance			Importance of dental appearance to overall appearance		
	Overall	Female (n=124)	Male (n=110)	Overall	Female (n=124)	Male (n=110)
10	5	5	5	5	5	4.1
20	5	5	6	6	6	5
30	6	6	7	7	7	6
40	7	7	7	7	8	7
50	7	7	8	8	8	8
60	8	8	8	8	8	8
70	8	8	8	8	9	8
80	9	8	9	10	10	9
90	10	10	10	10	10	10
Mean (SD)	7.23 (1.8)	6.97 (1.8)	7.50 (1.8)	7.47 (2.0)	7.72 (1.9)	7.212.1)

Table 2 Level of satisfaction with colour, shape, and position of teeth (n depends on presence/absence of dentures and on missing values).

	Not at all satisfied	Moderately satisfied	Completely satisfied
Satisfaction with colour of natural teeth (n=199, n=2 missing)	14 (7.1%)	47 (23.9%)	136 (69%)
Satisfaction with colour of denture teeth (n=210, n=2 missing)	7 (3.4%)	24 (11.5%)	177 (85.1%)
Satisfaction with shape of natural teeth (n=199, n=2 missing)	24 (12.2%)	38 (19.3%)	135 (68.5%)
Satisfaction with shape of denture teeth (n=210, n=1 missing)	7 (3.3%)	14 (6.7%)	188 (90%)
Satisfaction with position of teeth (n=225)	27 (12%)	35 (15.6%)	163 (72.4%)

Table 3 Last step of the regression model using rating satisfaction with dental appearance as dependent variable.

	Regression coefficient B (SE)	Standardised beta coefficient	T	Sig.
Constant	4.15 (0.84)		4.94	<0.001
Psychological well-being	0.05 (0.03)	0.11	1.71	0.088
Satisfied with position of teeth	1.04 (0.16)	0.40	6.34	<0.001

the effect of these on variance in dental appearance was rather low, however. Some studies focusing on older groups found gender and education had a significant effect on dissatisfaction with dental appearance in multivariate analysis; others reported the low value of multivariate models for predicting the relationship between the importance of dental appearance and education, and found no significant relationship with gender, marital status, place of residence, or use of dental care^{9,20}.

It could be demonstrated that the importance of dental appearance to overall attractiveness/appearance was high, also emphasising the importance of dental attractiveness up to advanced age. This could be seen to be in agreement with other studies which revealed an association between facial attractiveness and dental

appearance, irrespective of gender or background, for subjects aged 65 to 75 years²¹. The importance of the appearance of the teeth up to great age could be because dental appearance affects social interactions⁵. In studies which included subjects with a wider age range, however, this perceived importance of the appearance of the teeth was less in older patients than in younger patients²².

Only a few of the subjects believed lighter teeth would result in a higher quality of life. A reduced preference for whiter teeth and a lower perception that very white teeth are beautiful in the elderly compared with younger people has been shown previously²². It also confirms the results of Hartmann *et al.*²³ that people over 60 years did not wish for a change in appearance if it involved prosthodontic reconstruction²³.

Although some elderly were not at all satisfied with their dental appearance, the level of satisfaction with dental appearance was high. Dental appearance should also receive special attention for the elderly because self-perceived satisfaction with dental appearance was found to be very important to overall attractiveness. The position of the teeth was found to be one of the most important aspects of dental appearance and should therefore receive special attention during the fabrication of dentures.

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