Scientific Article

Importance of dental problems according to 12- to 16-year-old children

M.H.J. Assink, PhD J.G.C. Verhey, PhD J. Hoogstraten, PhD H. Goedhart, PhD

Abstract

The willingness to take preventive action is partly determined by the perceived importance of the disease. The purpose of this study was to investigate the relationship of age, sex, education, and ethnicity to the importance of dental and other health problems by 12- to 16-year-old children. The children (361 boys, 272 girls) attending Dutch schools were asked a series of questions requiring a choice by students as to the more important problems in a given pair of conditions. Conditions included systemic, dental, and psychological problems. Nervousness was the least important problem and hearing disability the most of the nine ranked. Having full dentures was ranked third, bad teeth fifth, and toothache sixth of the nine from least (first) to most important (ninth). Age, sex, education, and ethnicity showed no relationship to importance of problems alone or in aggregate. (Pediatr Dent 18:391–94, 1996)

A person's willingness to take preventive action is partly determined by the perceived importance of the disease.[1] The perceived importance of dental problems compared with other health problems was the subject of an earlier study.[2] Children, aged 12 to 16 years, judged the importance of dental problems in comparison to general health and psychological problems. The results were compared retrospectively with findings from a study of older subjects. Children, in general, judged dental problems less important than general health problems and more important than psychological problems, while adults ranked dental problems least important. Previous research suggests that age, educational level, sex, and ethnicity are related to dental health, dental behavior, and dental attitudes. These variables also may influence the perceived importance of dental problems.

Verrips et al.[3] state that 5-year-old boys show more caries than do 5-year-old girls. Rise et al.[4,5] report that Nordic girls aged 11, 13, and 15 years take better care of their teeth than do boys, and this difference increases with age. Syrjälä et al.[6] report that females have a more positive attitude toward dental care than do males and also take better care of their teeth.[7] These findings support that the willingness to take preventive action is higher for females than for males in all age categories and that this difference will increase with age.

The lower the level of education, the more barriers people have to regular tooth brushing.[6] Children who achieve higher education may consider dental problems to be more important than children with less education.

Ethnicity is also a potential determinant of dental health and behavior. The prevalence of caries among Turkish and Moroccan children is much higher than in Dutch, Surinamese, and other ethnic groups.[8–10] Turkish and Moroccan children brush their teeth and visit the dentist less frequently than do Dutch children,[11] which could imply that Turkish and Moroccan children consider dental problems less important than do other ethnic groups.

The purpose of this study was to investigate the relationship of age, sex, education, and ethnicity to the importance of dental and other health problems as judged by 12- to 16-year-old children.

Methods and materials

The study population of 634 children comprised 361 boys and 272 girls (the sex of one participant was not recorded). Subjects attended either schools for lower vocational education (407 subjects) or schools for lower general secondary education (227 subjects). Five age categories were included: age 12 (38 subjects), age 13 (192), age 14 (240), age 15 (126), and age 16 (34). The age of 4 subjects was not recorded. Ethnicity was assessed by asking the mother's country of origin and was categorized into five groups: Dutch (338 subjects), Turkish (20 subjects), Moroccan (44 subjects), Surinamese (122 subjects), and "other" from a wide range of countries (110 subjects). Because of the small sample size from each of the latter countries, we did not subdivide this group. The study was carried out

during a regular lesson as part of a more extensive study concerning dental health.

Nine problems (of dental, general, and psychological health) were used in this study: toothache (1), bad teeth (2), full dentures (3), hard of hearing (4), stomach complaints (5), poor on one's legs (6), depression (7), headaches (8), and nervousness (9). The importance of these problems was determined using the method of paired comparisons following a procedure initiated by Hoogstraten and Verhey[12] and Verhey and Hoogstraten.[13] A balanced pairwise comparison experiment was run in which there are $1/2\ N\ (N\text{-}1)$ pairs, where N denotes the number of stimuli or problems. Thirty-six pairs were presented in a questionnaire, each preceded by a standard instruction:

Which of these two persons is doing worse (circle A or B)?

Person A: is nervous
Person B: has a toothache

The order of presentation of the 36 pairs was based on the method of Ross.[14] This method achieves a completely balanced order of presentation of the stimuli and maintains the greatest possible separation between pairs having a stimulus in common.

The ranking of the importance of the problems for the total group of children was determined and the scale values associated with each problem was calculated according to the Bradley-Terry model.[15] Subsequently, the relationship between the independent variables of age, sex, education, and ethnicity and the importance of the nine problems was investigated. Univariate analyses data were represented in two-dimensional frequency tables, a problem-by-age, a problem-by-sex, a problem-by-education, and a problem-by-ethnicity table. Multivariate analyses data were represented in one frequency table — a problem-by-age-by-sex-by-education-by-ethnicity table. Using log-linear theory[16] the relationship between the independent variables and the importance of the nine problems was investigated.

The great number of potential observations (634 x 36 = 22,824) suggested all statistical tests would be almost surely significant, so the proportional reduction also was computed.[17] The proportional reduction is a measure for the proportion of variation in the data and is analogous to the coefficient of determination that is used in the context of multiple regression. The proportional reduction is 1.00 when (for example) the relationship between an independent variable and the importance of the nine problems is perfect and is zero when there is no relationship at all.

Results

The results of the ranking of the nine problems are presented in Table 1. From least to most important, they are: nervous, depressed, full dentures, headaches, bad teeth, toothache, stomach pain, poor on one's legs, and hard of hearing. The scale values according to the Bradley-Terry model associated with each problem also are presented in Table 1. The more important a stimulus is, the higher its scale value. The distances between the scale values show the differences in importance between the nine problems. The overall percentages with which each problem was judged as most important also are presented in Table 1, with minimum and maximum percentage found in the subgroups as defined by independent variables. For example, over all subjects and pairs, bad teeth was judged as most important in 11.1% of the cases. The minimum percentage is 9.6% and the corresponding subgroup is Moroccan children. The maximum percentage is 12.6% with the corresponding subgroup being 16-year-old children.

The 12- to 16-year-old children as a group judge psychological problems like being nervous and being depressed as least important. Dental problems take up a middle position while general health problems are regarded as being most important. The difference between the minimum and maximum percentages is not large, which means that the subgroups seem not to differ dramatically from each other. The greatest differ-

Table 1. Relative importance of nine health problems, their scale-value according to the Bradley-Terry model, and the minimum and maximum percentage in the 14 different subgroups*

Problem	*Scale Value (SD)*	*Overall*	*Minimum*	*Maximum*
Nervous	-0.97 (0.03)	6.0%	5.1%	6.8%
Depressed	-0.86 (0.03)	6.5%	4.3%	9.0%
Full dentures	-0.58 (0.03)	8.0%	5.9%	10.9%
Headaches	-0.05 (0.03)	10.7%	7.6%	11.6%
Bad teeth	-0.02 (0.03)	11.1%	9.6%	12.6%
Toothache	0.02 (0.03)	11.3%	10.5%	12.2%
Stomach pain	0.31 (0.03)	12.8%	11.1%	14.4%
Poor on one's legs	0.94 (0.03)	16.1%	14.6%	16.7%
Hard of hearing	1.20 (0.03)	17.3%	15.7%	18.2%

* Subgroups are defined by the independent variables age, sex, education, and ethnicity consisting of 5, 2, 2, and 5 subgroups respectively.

TABLE 2. UNIVARIATE AND MULTIVARIATE ANALYSES: THE LIKELIHOOD RATIO STATISTIC (G^2), DEGREES OF FREEDOM (DF), *P*-VALUE, PROPORTIONAL REDUCTION (PR), AND POWER

Effect	G^2	*DF*	*P*	*PR*	*Power**
Age					
Univariate	80.39	32	0.00	0.03	$1\text{-}10^{-4}$
Multivariate	77.00	32	0.00	0.02	$1\text{-}10^{-4}$
Sex					
Univariate	114.67	8	0.00	0.04	$1\text{-}10^{-12}$
Multivariate	115.90	8	0.00	0.03	$1\text{-}10^{-12}$
Education					
Univariate	37.80	8	0.00	0.01	$1\text{-}10^{-3}$
Multivariate	37.13	8	0.00	0.01	$1\text{-}10^{-3}$
Ethnicity					
Univariate	72.87	32	0.00	0.03	$1\text{-}10^{-4}$
Multivariate	67.73	32	0.00	0.02	$1\text{-}10^{-3}$
Total					
Multivariate	286.02	80	0.00	0.07	$1\text{-}10^{-14}$

* $1\text{-}10^{-3}$ means 0.999.

ence is 5% for full dentures, which was chosen in 5.9% of the cases by the 12-year-olds and in 10.9% of the cases by the 16-year-olds.

Table 2 presents the univariate analyses, using the G^2 (likelihood ratio) statistic to test whether the four independent variables are related to the importance of the nine problems. As expected, all four statistical tests are significant at $\alpha = 0.05$, indicating rejection of the null hypothesis of no relation. For all independent variables, the proportional reduction is (very) small. The largest proportional reduction is 0.04, which means that 4% of the variation is due to differences between girls and boys. In other words, there are only small differences between the scale values for girls and boys. Due to the extremely high power, which is also given in Table 2, these small differences are statistically significant. Therefore, it is concluded that the importance of the nine problems is the same for girls and boys. The same conclusion applies to the three other independent variables.

The multivariate analyses also are presented in Table 2, with the G^2 statistic used to test the relationships among the four independent variables and the importance of the nine problems. The statistical tests are significant at $\alpha = 0.05$. For all independent variables the proportional reduction is (very) small. Within the multivariate approach it is possible to estimate the combined effect of the four independent variables on the importance of the nine problems. The proportional reduction for the combined effect is 0.07, which is rather small. Also in these analyses, these small differences are statistically significant due to the (extremely) high power, which is also given in Table 2. Both the univariate and multivariate analyses lead to the conclusion that the importance of the nine problems does not depend on age, sex, education, or ethnicity. Also, the combined effect of the four independent variables on the importance of the nine problems is small.

Discussion

A possible explanation for these findings is that although dental behavior and dental attitude differ in the various groups, this is not represented in the perceived importance of dental problems. It is not clear to what extent dental health, dental attitude, dental behavior, and the importance of dental problems are connected, but it seems highly unlikely that the dental behavior of children or adults is not at least partly explained by the weight people give to a healthy dental situation. We might add that what we measured is the relative importance, not the importance in an absolute sense.

The difference between the two types of school is minor, which might explain the absence of an effect of this variable. Concerning ethnicity, it is possible that children whose mother was born in another country but who have grown up in the Netherlands have undergone the same influences as Dutch children. Nevertheless, the fact that the predictions of an effect of different variables on the importance of individual problems do not hold implies that the questionnaire seems to be a quite stable instrument with regard to influences of age, sex, education, and ethnicity in this group of children. Stated differently, 12- to 16-year-old children feel that the importance of dental and other individual problems is the same, irrespective of their age, sex, level of education, or ethnicity. It certainly can not be generalized to groups that differ more in age, as was shown in a related study[12] where the importance of the same nine problems for young adults was different from the importance as judged by 12- to 16-year-old children.

Dr. Assink, Dr. Verhey, Dr. Hoogstraten, and Dr. Goedhart are all members of the department of social dentistry and dental health education, Academic Centre for Dentistry in Amsterdam, The Netherlands.

1. Becker MH, Haefner DP, Kasl SV, Kirscht JP, Maiman LA, Rosenstock IM: Selected psychosocial models and correlates of individual health-related behaviors. Med Care 15:27–46, 1977. [Suppl 5]
2. Assink MHJ, Verhey JGC, Hoogstraten J, Goedhart H: Importance of dental and other individual problems: adolescents versus young adults. Community Dent Oral Epidemiol 23:369–73, 1995..
3. Verrips GH, Frencken JE, Kalsbeek H, ter Horst G, Filedt Kok-Weimar TL: Risk indicators and potential risk factors for caries in 5-year-olds of different ethnic groups in Amsterdam. Community Dent Oral Epidemiol 20:256–60, 1992.

4. Rise J, Wold B, Aarö LE: Determinants of dental health behaviors in Nordic schoolchildren. Community Dent Oral Epidemiol 19:14–19, 1991.
5. Rise J, Haugejorden O, Wold B, Aarö LE: Distribution of dental health behaviors in Nordic schoolchildren. Community Dent Oral Epidemiol 19:9–13, 1991.
6. Syrjälä AH, Knuuttila MLE, Syrjälä LK: Suitability of Krathwohl's affective taxonomy for evaluating patient attitudes to dental care. Community Dent Oral Epidemiol 18:299–303, 1990.
7. Syrjälä AH, Knuuttila MLE, Syrjälä LK: Reasons preventing regular dental care. Community Dent Oral Epidemiol 20:10–14, 1992.
8. Verrips GH, Filedt Kok-Weimar TL, Frencken JE, Kalsbeek H: Mondgezondheid van Amsterdammertjes. Leiden: NIPG/TNO, 1990.
9. Bergink AH, Reuser JAM: Cariës bij Nederlandse, Hindoestaanse, Marokkaanse en Turkse kleuters. Epidemiol Bul Grav 1:20–25, 1990.
10. Westerhof H: Gebitsgezondheid van 12-16-jarigen; onderzoek bij deelnemers van de Haagse jeugdtandzorg. Epidemiol Bul Grav 1:26–32, 1990.
11. Verrips GH, Kalsbeek H, Eijkman MAJ: Ethnicity and maternal education as risk indicators for dental caries and the role of dental behavior. Community Dent Oral Epidemiol 21:209-14, 1993.
12. Hoogstraten J, Verhey JGC: Judging severity of dental problems in relation to other individual problems. Community Dent Oral Epidemiol 14:65–68, 1986.
13. Verhey JGC, Hoogstraten J: Severeness of toothache and other symptoms as a function of frequency of occurrence and intensity. Community Dent Oral Epidemiol 14:142–45, 1986.
14. Ross RT: Optimum orders for the presentation of pairs in the method of paired comparison. J Educ Psychol 25:375–82, 1934.
15. Bradley RA, Terry ME: Rank analysis of incomplete block designs. I. The method of paired comparisons. Biometrika 39:324–25, 1952.
16. Everitt BS: The analysis of contingency tables. London: Chapman & Hall, 1977.
17. Goodman LA: The multivariate analysis of qualitative data: interactions among multiple classifications. J Am Stat Assoc 65:226–56, 1970.