Gender differences in knowledge, attitude, behavior and perceived oral health among adolescents

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A cross-sectional dental questionnaire census survey was conducted in classrooms of 17,280 students aged 13–18 years in Skaraborg County, Sweden. The overall response rate, based on school attendance on the test day, was 91% with no gender differences at the senior level, and 86% (boys 87%, girls 85%) at the upper secondary level. The aim was to examine gender differences in knowledge, attitude, behavior and perceived oral health. A retest study showed good agreement. Thirty-one percent of the girls and 21% of the boys flossed regularly. Eleven percent reported daily candy consumption, with no significant gender difference. Girls, however, more often than boys considered their own consumption to be too high. This gender difference in attitude was most pronounced among older daily consumers (odds ratio (OR) = 5.8 [3.7–9.2]). Oral health was regarded as important by a majority of the students (95%). Girls considered sound teeth to be more important than did boys, both among the younger (OR = 1.7 [1.4–2.1]) and the older (OR = 2.4 [1.9–3.1]) adolescents. It is concluded that most adolescents had a positive dental attitude and perceived their own oral health to be good. Poorer knowledge and behaviors concerning oral health were demonstrated. Gender differences existed in most issues. Girls scored more favorably on behavioral measures, showed more interest in oral health, and perceived their own oral health to be good to a higher degree than did boys. □ *Children; habits; oral health; public health dentistry; questionnaire*

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For more than half a century, comprehensive dental care for schoolchildren has been provided by the Public Dental Service in Sweden. During the first decades, almost all children had caries, which were treated primarily by filling the lesions or extracting the tooth. This was gradually supplemented by organized prophylactic measures; for instance, collective fluoride rinsing in schools and counselling at child welfare centers, which were launched in the early 1960s.

The need for data on the prioritization and planning of dental care soon became evident; thus comprehensive epidemiological systems were established in most counties in Sweden at the beginning of the 1980s. The oral health of children and adolescents has since been monitored. These registrations and research results show that the oral health of most people in these ages is good and improving (1–3). For a minor group, however, the situation is persistently poor (4, 5). The downturn in the economy during the 1990s has had a considerable impact on the dental service in recent years. This entails sustained demands on effectiveness and quality of dental services, focusing on those patients who have the greatest need.

Enhancement of oral health is attained through a combination of individual preventive measures and community health promotion activities. Social and personal well-being are considered together with physical capacities, emphasizing the individual through empowerment and participation (6). This has necessitated a widening of the epidemiological monitoring, which hitherto has described oral health from a professional aspect. Although the patients' own experiences of their oral health gain have been shown to be valuable and reliable for planning purposes (7, 8), this perspective is rarely taken into account. Behavior issues have primarily been considered in this context (9–13). The aim of the present study was to describe dental knowledge, attitude, behavior and perceived oral health in relation to age and gender among adolescents.

Materials and methods

A series of comprehensive annual school questionnaires in Skaraborg County, Sweden, was performed. The present study was part of these and completed as a census survey in November 1996. It comprised 17,280 students at the senior level of compulsory school (9,559 students, aged 13–15 years) and at the upper secondary level (7,721 students, aged 16–18 years) of all schools in Skaraborg County. The numbers of participants in relation to age and gender are displayed in Table 1. Internal dropouts in age and gender questions account for the discrepancy (278 cases) of respondents in Table 1 from the total number of participants. The overall response rate, based on school attendance on the test day, was 91% with no gender differences at the senior level, and 86% (boys 87%, girls 85%) at the upper secondary level. Internal dropouts were 1–4% among girls and 1–6% among boys at the senior

Table 1. Number of participants according to gender and grade

Form (age)	Boys	Girls	Total
7 (13 yrs)	1592	1539	3131
8 (14 yrs)	1681	1515	3196
9 (15 yrs)	1559	1490	3049
1 (16 yrs)	1519	1399	2918
2 (17 yrs)	1257	1203	2460
3 (18 yrs)	1131	1117	2248
Total	8739	8263	17002

level, and 0.5–2% among girls and 1–3% among boys at the upper secondary level. Self-reported questionnaires were answered anonymously in a standardized manner in the classrooms. Each student put the filled-in questionnaire in an envelope and sealed it. The envelopes were then sent to a coordinating center for data processing. The questionnaire covered several health-related and lifestyle topics besides those in the present study.

Retest

In April 1997, 5 months after the original study, a retest study of the questionnaires was performed at one middle-class urban school and under the same conditions as in the original study. Due to the anonymous performance, participants in the original and retest study could not be identified. All 14-year-old students present on the current day participated. The response rate, based on school attendance, was 98% in the original study and 86% in the retest study. Internal dropouts were on average 1.4% in the original study and 1.0% in the retest study. A selection of studied variables was tested.

Variables

The statements "It is important to me to have sound teeth", "I think dental visits are unpleasant", and "My oral health is good" each had the four choices 'corresponds precisely'/'corresponds roughly'/'corresponds poorly'/'corresponds not at all'. These variables were dichotomized; 'corresponds precisely' and 'corresponds roughly' were given value 1, and 'corresponds poorly' and 'corresponds not at all' value 0. "How often do you eat candy?" had five alternatives and was dichotomized with the options 'never/seldom/once a week/a few times a week' in one category and 'daily' in the other. When the students' opinions of their own candy consumption were queried, breakfast (choices: never/only on weekends/a few times a week/daily) and school lunch (choices: never/some times a week/every schoolday) habits were adjusted for. All other variables were originally binary with the possible answers 'yes' or 'no'. Three variables concerning appraisal of personal oral health, occurrence of bleeding gums, and dental appearance were combined into a perceived oral health index (POH index), according to the model used by Hamp & Nilsson (14). The index scores were obtained by assigning points to the answers: '0' if the answer was negative and '1' if the answer was positive.

Methods of analysis

The statistic programs SPSS (Statistical Package for the Social Sciences) version 8.0 and EpiInfo were used for data analyses. Correlations were estimated using linear and logistic regressions and expressed as odds ratios with 95% confidence intervals. When indicated, school level, gender and other variables were entered in the regression as covariates. In the retest study, frequency distribution was compared to the original study by contingency tabling using χ^2 to test for homogeneity. Statistical significance was assumed when $P < 0.05$ or when the 95% confidence interval excluded 1.0.

Results

The differences between the main inquiry and the retest inquiry were small and non-significant (Table 2). The distribution of students by gender and school level, and age-adjusted odds ratios for gender in all variables are given in Table 3.

Table 2. Results of retest study. All students in the eighth form (14 years old) at one school ($N = 152$ (original study), $n = 136$ (retest study))

Question	Original study* Range 61–143 percent	Retest study† Range 48–134 percent	*P*
My oral health is good	85	88	0.6
Sound teeth are important	94	99	0.2
Dental visits are unpleasant	40	35	0.4
Bacterial films cause inflammation of gums	84	89	0.4
Satisfied with appearance of teeth	58	57	0.9
Positive POH index	80	78	0.8

† Missing cases 0–6%.
* Missing cases 1–6%.

Table 3. The proportions of subjects with high scores on questions and index at the senior level (13–15 years) and the upper secondary level (16–18 years). Gender differences expressed as OR (odds ratios) and CI (95% confidence intervals) for high-scoring girls using boys as reference with adjustment for age. *n*: 4832 (boys), *n*: 4544 (girls) at the senior level, *n*: 3907 (boys), *n*: 3719 (girls) at the upper secondary level

	Boys	Girls		
Senior level (range)	558–4495	453–4436		
Upper secondary level (range)	412–3678	412–3663		
	percent	percent	OR	CI
Caries is a disease				
Senior level	46	45	1.0	0.9–1.1
Upper secondary level	54	56	1.1	1.0–1.2
Bacterial films cause inflammation of gums				
Senior level	89	91	1.1	1.0–1.3
Upper secondary level	92	94	1.4	1.2–1.6
Tobacco harms gums				
Senior level	97	99	3.5	2.5–5.0
Upper secondary level	96	99	6.5	4.1–10.4
Sound teeth are important				
Senior level	94	97	1.7	1.4–2.1
Upper secondary level	94	97	2.4	1.9–3.1
Dental visits are unpleasant				
Senior level	35	40	1.3	1.2–1.4
Upper secondary level	39	45	1.3	1.2–1.4
Floss usage				
Senior level	22	29	1.5	1.4–1.6
Upper secondary level	20	32	1.9	1.7–2.1
Fluoride usage				
Senior level	54	58	1.2	1.1–1.3
Upper secondary level	44	54	1.5	1.4–1.7
Eating candy daily				
Senior level	12	10	0.9	0.7–1.0
Upper secondary level	11	11	1.1	0.9–1.2
Regarding own candy consumption as too high				
Senior level	44	59	1.8	1.7–2.0
Upper secondary level	41	64	2.5	2.3–2.8
My oral health is good				
Senior level	88	91	1.4	1.2–1.6
Upper secondary level	85	91	1.7	1.5–2.0
Bleeding gums when toothbrushing				
Senior level	23	20	0.9	0.8–0.9
Upper secondary level	20	16	0.8	0.7–0.9
Satisfied with appearance of teeth				
Senior level	67	59	0.7	0.6–0.8
Upper secondary level	65	65	1.0	0.9–1.1
Positive POH index				
Senior level	84	85	1.1	1.0–1.2
Upper secondary level	84	89	1.5	1.3–1.7

Knowledge

Questions on the pathogenesis of gingivitis and the effects of tobacco on oral health were answered correctly by more than 90% of the students. Gender differences in favor of girls were found at both the senior and the upper secondary levels. Overall, 50% did not know that caries is a disease, although older students showed better knowledge than younger. Girls at the upper secondary level demonstrated better knowledge than boys, but at the senior level no gender difference was seen.

Attitudes

Oral health was regarded as important by a majority of the students (95%), and this was consistent at both levels. Girls considered sound teeth to be more important than did boys, both among the younger (OR = 1.7 [CI: 1.4–2.1]) and among the older (OR = 2.4 [CI: 1.9–3.1]) adolescents. Forty percent of the adolescents regarded dental visits as unpleasant, and this proportion was larger among older adolescent boys and girls. However, girls had a significantly greater risk than boys at the senior level (OR = 1.3 [CI: 1.2–1.4]) and at the upper secondary level (OR = 1.3 [CI: 1.2–1.4]) for regarding dental visits as unpleasant.

Behavior

The prevalence of floss usage was 26% among all students. Female gender was related to more frequent floss

Table 4. The proportions of subjects by gender and school level in opinion of own candy consumption. OR (odds ratios) and CI (95% confidence intervals) for girls regarding their own consumption as too high, using boys as reference. Adjusted for breakfast and school lunch habits. *n*: boys/girls: 4572/4395 at the senior level, 3796/3674 at the upper secondary level

	Boys		Girls			
	Yes %	No %	Yes %	No %	OR	CI
Senior level						
Daily consumption	69	31	87	13	3.3	2.3–4.6
A few times a week–consumption	56	44	76	24	2.5	2.1–2.8
Once a week-consumption	30	70	41	59	1.6	1.4–1.9
Seldom or never-consumption	12	88	10	90	0.7	0.5–1.1
Upper secondary level						
Daily consumption	72	28	94	6	5.8	3.7–9.2
A few times a week–consumption	59	41	83	17	3.2	2.7–3.9
Once a week-consumption	30	70	51	49	2.5	2.1–2.9
Seldom or never consumption	9	91	7	93	0.8	0.5–1.2

Missing cases 4.7%.

use: OR = 1.5 [1.4–1.6] at the senior level and OR = 1.9 [CI: 1.7–2.1] at the upper secondary level. There were small differences with respect to floss usage between older (32%) and younger (29%) girls and between older (20%) and younger (22%) boys.

Additional fluoride use other than dentifrice was more frequent among the younger teenagers. Girls reported significantly higher figures than boys at both levels.

Eleven percent reported daily candy consumption, and no gender differences were seen. When differences in candy consumption and age were accounted for, boys less often perceived their own candy consumption as too high ($P < 0.01$). Table 4 lists girls' opinions compared to boys' about stated personal candy consumption. Girls considered their own candy consumption to be too high significantly more often than did boys, except among seldom or never consumers. This difference was more pronounced at the upper secondary level. The difference remained when the results were adjusted for eating habits (breakfast and school lunch).

Perceived oral health

Most adolescents (89%) regarded their oral health as good. Female gender was to a higher degree than male gender related to a good perception of personal oral health, at the senior (OR = 1.4 [1.2–1.6]) and upper secondary (OR = 1.7 [1.5–2.0]) levels. Twenty percent had noticed bleeding when brushing their teeth. A minor gender difference was observed. Fewer girls than boys reported bleeding: OR = 0.9 [0.8–0.9] among younger and OR = 0.8 [0.7–0.9] among older adolescents.

Girls at the senior level were less satisfied with the appearance of their teeth than were boys (OR = 0.7 [0.6–0.8], while no gender difference was found among the older adolescents. Boys at the senior and upper secondary levels scored equally well on the POH index. Girls at the upper secondary level, however, scored somewhat better than did girls at the senior level. Significant gender difference were seen among older adolescents: 89% of the girls scored positively on the index compared with 84% of the boys (OR = 1.5 [1.3–1.7]).

Discussion

Most adolescents had a positive dental attitude and perceived their own oral health to be good. Poorer knowledge and behavior were demonstrated. Gender differences were found in most issues. Girls scored more favorably than boys on the behavioral measures, use of dental floss and fluorides. Gender differences in considering dental visits to be unpleasant were found, with greater probability in girls. Female gender was to a higher degree related to a positive perception of own oral health.

Census surveys are seldom carried out because of high costs and practical difficulties, but are sometimes conducted when many people are gathered for other reasons, for instance at school or in the military service (15), which also ensures a high participation rate. The dropout group constituted those not present at school on the test day. The composition of this group probably does not correspond to that of the respondent group but includes, for instance, truant individuals. The internal dropouts were higher among the younger adolescents and among boys, with possible concomitant effects on results. A good concordance between the original and the retest study was seen, and the anonymity of the participants probably enhanced the likelihood of truthful answers (16, 17). However, the possibility of differences due to learning or maturation should always be considered.

Poor knowledge of causes and symptoms of dental diseases in different populations has been reported by several authors (18–20). The present study shows that causal factors for gingivitis and harmful effects of tobacco use on oral health were well known by the adolescents. In the relatively small group of adolescents ignorant about the effects of tobacco use, the girls were in a marked

minority, which resulted in a significant gender difference. However, knowledge that caries is a disease was poor. Earlier studies have revealed difficulties in performing knowledge tests (18). This could be seen here in the question about caries, which was possibly unclear and easily misunderstood.

The more favorable attitudes of females on health-related issues have been shown by several authors (21, 22). This was seen in our study through the greater proportion of boys in the group who did not regard sound teeth as important.

Most studies have found a decrease in dental anxiety with increasing age (23, 24), but Neverlien (25) reported increasing dental anxiety among adolescent girls by age and stable figures for boys. Higher prevalences among females have been reported in many studies (26, 27), which is consistent with our findings. However, we found a higher prevalence of unpleasant feelings about dental appointments in upper adolescence for both boys and girls. Methods of measuring dental anxiety, as well as reported prevalences (20–40%), vary greatly in different studies (23–25, 28). Because of the different methodologies used in these studies with corresponding differences in reported results, they are not readily comparable.

Certain gender differences were found concerning behavior. Only one-fourth of all adolescents flossed, significantly more girls than boys, which was a consistent trend at all ages studied. Similarly low figures for floss usage have been reported by other investigators (10, 19, 29, 30). Gender differences in floss usage have also been found by others (12). Fluoride use other than dentifrice was more frequent among girls than among boys, and higher figures were reported than have been found by other investigators (9, 31). One explanation could be that young people consider fluorides to be anything that is more teeth favorable in general. For instance, artificial sweeteners might have been considered to be a fluoride, and the stated fluoride use could then be interpreted as any consciously sound choice. In any case, the reported fluoride use was most likely not consistent with actual exposure.

Sundin et al. (32) concluded in 1983 that consumption of candy did not seem to be as strong a predictive factor for the occurrence of caries as it used to be. In most investigations of dietary habits, daily consumption of candy is reported (9, 33). In the present study, daily consumption was studied to pinpoint the very high-risk individuals. The percentage of adolescents reporting daily candy consumption (11%) was less than in other investigations (9, 30, 33), all reporting prevalences of over 20% in early adolescence. The present investigation was performed in a rural county with a few medium-sized towns. The consumption pattern could be different in the countryside, which may contribute to the rather low prevalence.

There were no significant differences between boys and girls in stated candy consumption. Gender differences in judgement of personal consumption are interesting in this context and most striking among daily consumers in later adolescence. One explanation might be different approaches to eating among boys and girls (34). However, gender differences remained when other eating habits were taken into account. Girls' greater awareness of their risky behavior could perhaps be related to a higher health interest (21, 22), even if it does not result in healthy behavior.

Most adolescents (89%) regarded their own oral health as good, which is consistent with the epidemiological registrations concerning caries, both in the county and on the national level (2). In the English investigation by Freeman et al. (28), 70% considered the state of their teeth and gums to be good.

The state of the gums is not a variable reported in the records of the Public Dental Service. Two of 10 students, fewer girls than boys, had observed that their gums bled during toothbrushing, a figure consistent with findings by Kallio et al. (35) in Finnish adolescents. Girls' greater interest in their health is a plausible explanation (21, 22). In addition, some students might have had unobserved bleeding, which is why the findings in our study might be an underestimation of the true prevalence. This is supported by the low correlations between the self-reported and the normatively assessed gingival conditions reported by Kallio et al. (35). Kallio et al. (36), however, suggested that self-assessment of bleeding could be a useful method for monitoring the gingival health of populations.

Young people are critical of their own appearance, which is true both for total appearance and for dental looks (37, 38). The proportion of satisfied subjects in the present study is concordant with several other studies (38, 39). Girls were more often dissatisfied with the appearance of their teeth; this has also been found by others (38). It has to be considered that the growth of the jaws and teeth is not completed in the ages studied, which probably affects appearance negatively in the students' opinion.

The POH index was less distinct than the sole statement "My oral health is good" in showing gender differences. The greater number of nuances in the index besides perceived oral health (bleeding gums and dental appearance) seems to have had an adjusting effect.

The present investigation was performed on an aggregated level. Greater differences could be expected if the survey focused on subgroups; for instance, girls and boys in one age or in specific districts. The importance of gender for general health behavior and health interest has been verified in several studies (21, 22, 40). The gender patterning of adolescent dental health behavior, attitude and perceived oral health in the present study supports their findings. Different life conditions for boys and girls may influence their attitudes and behavior differently, and this is an important question for further studies.

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References

1. von der Fehr FR. Caries prevalence in the Nordic countries. Int Dent J 1994;44:371–8.
2. Sundberg H. Changes in the prevalence of caries in children and adolescents in Sweden 1985–1994. Eur J Oral Sci 1996;104:470–6.
3. Marthaler TM, O'Mullane DM, Vrbic V. The prevalence of dental caries in Europe 1990–1995. ORCA Afternoon Symposium 1995. Caries Res 1996;30:237–55.
4. Haugejorden O. Changing time trend in caries prevalence in Norwegian children and adolescents. Community Dent Oral Epidemiol 1994;22:220–5.
5. Swedberg Y, Fredén H, Norén JG. Caries extreme groups among adolescents, leaving organised dental care in Göteborg, Sweden. Swed Dent J 1997;21:221–6.
6. Ottawa Charter for Health Promotion. WHO: Health Promotion International, 1986.
7. Maas WR. Demands and opportunities for development of self-reported assessments of oral health outcomes. J Dent Educ 1996;60:508–13.
8. Frenn M, Malin S. Health promotion: theoretical perspectives and clinical applications. Holist Nurse Pract 1998;12:1–7.
9. Honkala E, Kannas L, Rimpela M, Wold B, Aaro LE, Gilles P. Dental health habits in Austria, England, Finland and Norway. Int Dent J 1988;38:131–8.
10. Honkala E, Kannas L, Rise J. Oral health habits of school-children in 11 European countries. Int Dent J 1990;40:211–7.
11. Sundin B. Dental caries and sugar-containing products. Analytical studies in teenagers. Thesis. Faculty of Odontology, Lund University, Sweden 1994.
12. Kuusela S, Honkala E, Kannas L, Tynjälä J, Wold B. Oral hygiene habits of 11-year-old schoolchildren in 22 European countries and Canada in 1993/1994. J Dent Res 1997;76:1602–9.
13. Åström AN, Jakobsen R. The effect of parental dental health behavior on that of their adolescent offspring. Acta Odontol Scand 1996;54:235–41.
14. Hamp SE, Nilsson T. The Munkhagen interdisciplinary studies. Department of Social Science, Linköping University, Sweden, 1982.
15. Halling A, Larsson PG. A study of 11,525 18-year-old men in southern Sweden in 1983. Swed Dent J 1986;10:119–23.
16. Dube KC, Kumar A, Gupta SP, Kumar N, Dube S. The question of onymity and anonymity of a questionnaire in a drug use survey. Bull Narc 1981;33:45–8.
17. Safer DJ. Self-reported suicide attempts by adolescents. Ann Clin Psychiatry 1997;9:263–9.
18. Hamp SE, Bergendahl B, Erasmie T, Lindström G, Mellbring S. Dental prophylaxis for youths in their late teens. II. Knowledge about dental health and diseases and the relation to dental health behavior. J Clin Periodontol 1982;9:35–45.
19. Hugosson A, Koch G, Bergendal T, Hallonsten AL, Slotte C, Thorstensson B, Thorstensson H. Oral health of individuals aged 3–80 years in Jönköping, Sweden in 1973, 1983, and 1993. Swed Dent J 1995;19:225–41.
20. Brook U, Heim M, Alkalai Y. Attitude, knowledge and habits of high school pupils in Israel regarding oral health. Patient Educ Couns 1996;27:171–5.
21. Dean K. Self-care components of lifestyles: the importance of gender, attitudes and the social situation. Soc Sci Med 1989;29:137–52.
22. Tinsley BJ, Holtgrave DR, Reise SP, Erdley C, Cupp RG. Developmental status, gender, age, and self-reported decision-making influences on students' risky and preventive health behaviors. Health Educ Q 1995;22:244–59.
23. Klingberg G. Dental fear and behavior management problems in children. Swed Dent J 1995;Suppl 103.
24. Thomson WM, Poulton RG, Kruger E, Davies S, Brown RH, Silva PA. Changes in self-reported dental anxiety in New Zealand adolescents from ages 15 to 18 years. J Dent Res 1997;76:1287–91.
25. Neverlien PO. Dental anxiety, optimism-pessimism, and dental experience from childhood to adolescence. Community Dent Oral Epidemiol 1994;22:263–8.
26. Hakeberg M. Dental anxiety and health. Göteborg University 1992. Thesis.
27. Liddell A, Locker D. Gender and age differences in attitudes to dental pain and dental control. Community Dent Oral Epidemiol 1997;25:314–8.
28. Freeman R, Maizels J, Wyllie M, Sheiham A. The relationship between health related knowledge, attitudes and dental health behaviours in 14–16-year-old adolescents. Community Dental Health 1993;10:397–404.
29. Lissau I, Holst D, Friis-Hasché E. Dental health behaviors and periodontal disease indicators in Danish youths. A 10-year epidemiological follow-up. J Clin Periodontol 1990;17:42–7.
30. King A, Wold B, Tudor-Smith C, Harel Y. The health of youth: a cross-national survey. WHO 1996. Regional Publications, European Series, No. 69.
31. Honkala E, Nyyssönen V, Rimpelä A. Use of fluorides by Finnish adolescents. Scand J Dent Res 1984;92:517–23.
32. Sundin B, Birkhed D, Granath L. Is there not a strong relationship nowadays between caries and consumption of sweets? Swed Dent J 1983;7:103–8.
33. Árnadóttir IB, Rozier RG, Saemundsson SR, Sigurjóns H, Holbrook WP. Approximal caries and sugar consumption in Icelandic teenagers. Community Dent Oral Epidemiol 1998;26:115–21.
34. Grogan SC, Bell R, Conner M. Eating sweet snacks: gender differences in attitudes and behaviour. Appetite 1997;28:19–31.
35. Kallio P, Nordblad A, Croucher R, Ainamo J. Self-reported gingivitis and bleeding gums among adolescents in Helsinki. Community Dent Oral Epidemiol 1994;22:277–82.
36. Kallio P. Self-assessed bleeding in monitoring gingival health among adolescents. Community Dent Oral Epidemiol 1996;24:128–32.
37. Zauner J. Psychosomatische Aspekte der Adoleszenz. Z Psychosom Med Psychoanal 1978;1:17–30.
38. Pietilä T, Pietilä I. Dental appearance and orthodontic services assessed by 15–16-year-old adolescents in Eastern Finland. Community Dental Health 1996;13:139–44.
39. Graber LW, Lucker GW. Dental esthetic self-evaluation and satisfaction. Am J Orthod 1980;77:163–73.
40. Ross-Petersen L, Holstein BE, Due PE. Sex differences in health behavior and self assessed health in 11–15 years old children. A comparison between life conditions and health. Ugeskr Laeger 1995;157:2447–51.

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