

ORIGINAL ARTICLE

Oral health-related knowledge, attitudes and habits in relation to perceived oral symptoms among 12-year-old school children

Marja-Leena Mattila^{a,b}, Mimmi Tolvanen^{c,d}, Johanna Kivelä^c, Kaisu Pienihäkkinen^c, Satu Lahti^c and Marina Merne-Grafström^a

^aOral Health Care, Welfare Division, City of Turku, Turku, Finland; ^bDepartment of Public Health, University of Turku, Turku, Finland; ^cDepartment of Community Dentistry, University of Turku, Turku, Finland; ^dFinnBrain Study Group Turku Brain and Mind Center, University of Turku, Turku, Finland

ABSTRACT

Objective The aim of the study was to investigate oral health-related knowledge, attitudes and habits and their relationship to perceived oral symptoms among 12-year-olds and differences between boys and girls. **Material and methods** The study population consisted of children ($n = 588$) in 15 randomly selected elementary schools in Turku, Finland. Associations between oral health-related habits, knowledge and attitudes with perceived oral symptoms and gender differences were evaluated with χ^2 -test, Mann-Whitney U-test and logistic regression analysis. **Results** Oral health promoting habits but not knowledge or attitudes associated significantly with absence of oral symptoms. Girls reported a higher percentage of several health promotional habits than boys. Girls reported more frequently gingival bleeding and less frequently dental calculus than boys did. The most common oral symptom was gingival bleeding. **Conclusions** The present findings suggest some gender-related differences in oral health habits, attitudes, as well as perceived oral symptoms in 12-year-olds. There seems, however, not to be gender differences in relation to knowledge or the association of health habits with perceived oral symptoms. It is important to maintain health promotion at schools and additional efforts should be aimed at translating knowledge into action.

ARTICLE HISTORY

Received 20 July 2015
Revised 1 December 2015
Accepted 29 December 2015
Published online
11 February 2016

KEYWORDS

Adolescents; health behaviour; oral health-related problems

Introduction

In Finland, free public oral healthcare is available for individuals under 18 years of age. Check-ups at intervals and preventive efforts are provided for age groups and individually depending on health status and risk factors. Currently, most children and adolescents have good oral health.[1] However, there are still challenges as a clear polarization of oral diseases and poor oral care habits still prevail. Additionally, the overall declining trend of caries occurrence rate has levelled out[2] and the proportion of 12-year-olds without dental decay has even decreased.[3]

Biofilm-involving diseases such as dental caries and periodontal disease are the most prevalent oral conditions in children. The disease aetiologies are multifactorial with a complex interaction of genetic susceptibility, environmental determinants and risk-modifying behavioural factors.[4,5]

Children with regular tooth brushing habits have been reported to have a significantly lower risk for caries than those with only occasional habits.[6,7] Previous caries experience is a strong predictor for future dental health.[8] Brushing may control caries.[7] Despite some improvement in recent years, general population data on twice-a-day tooth brushing, especially among boys, show lower brushing frequency in Finland than in other Western-European and, especially, Nordic countries.[9–12] For school-aged children the national

guideline recommends brushing teeth twice a day with fluoridated toothpaste, adherence to regular eating patterns and use of water for quenching thirst. For arresting early caries lesions professional prophylaxis, recommendation to use xylitol products and application of topical fluorides and/or dental sealants may be used to support and enhance self-care.

In the Turku area, regular preventive efforts by disseminating information, by means of interactive play and lectures, have been undertaken in daycare and schools. The stimulation and accentuation of the importance of self-care practices by healthcare professionals are known to affect oral health habits and status throughout life.[8] However, the average number of DMFT (Decayed, Missed or Filled Teeth) of 12-year olds in the Turku area was higher (1.1) than the Finnish average (0.7) in an intercity comparison in 2011,[3] highlighting the importance of finding additional preventive approaches. The age group selected for this study is in a sensitive phase, providing a great opportunity to influence behavior, but it also presents a challenge as other interests occupy the minds of developing individuals. There was a clear need to evaluate the status of knowledge and attitudes coupled to habits and possible oral health symptoms in an effort to facilitate the development of interesting and effective self-care programmes. The aim of the study was to investigate oral health-

related knowledge, attitudes and habits and their relationship to perceived oral symptoms among 12-year olds and differences between boys and girls.

Materials and methods

This questionnaire study aimed to include about half of the school children attending sixth grade (12-year olds; $n = 1373$) of altogether 25 public elementary schools in the city of Turku, Finland. This proportion was considered to represent well the 12-year-olds and allow the comparison between genders in relation to reported health habits and perceived oral symptoms. The schools were randomly selected by drawing lots from the 25 schools until the required sample proportion was reached ($n = 746$). Fifteen of the 17 selected schools returned the questionnaires ($n = 588$). The schools were from different socioeconomic areas of the town. Schools for individuals with special needs were not included in the study. Of the target students ($n = 746$), 588 (78.8%) returned questionnaires and 67 (10.2% of the 655 students in participating 15 schools) were absent on the day of the investigation or for some reason did not fill in the questionnaire. Of the study population, 290 were girls, 289 were boys, and nine did not report their gender.

The study was carried out at school during the school day and the questionnaires were filled by all the students present without recording names or other personal identification. The parents were informed about the study by e-mail through a web interface connection (Wilma) used for parent-school communication. If the parents did not want to allow their child to participate in the study the parents were asked to inform the study coordinator by e-mail or phone. Even though the parents allowed the participation, the child could refuse to participate.

The questionnaire contained a total of 112 questions on background information, oral and general health-related knowledge, attitudes and habits, and self-perceived oral symptoms. The questions were similar to those previously used in international and national studies, found to be reliable and valid.[9,13–15] The questionnaires were pre-tested in children of the same age as the target children and in adults. The questions included also 'the professions of mother and father'. The answers by the 12-year-olds were found to be unreliable or missing in many cases. Therefore, this information could not be used in the analyses.

Perceived oral symptoms were studied using questions or statements including 'In my mouth' or 'I have noticed' the following (1) tooth-ache, (2) decayed teeth, (3) bleeding gums when brushing teeth, (4) gingivitis, (5) calculus or (6) nothing mentioned above. These alternatives were dichotomized as having symptoms vs no symptoms.

The oral health behaviours investigated included tooth brushing with fluoride toothpaste, flossing, use of xylitol products and consumption of soft drinks, sweets and sports drinks. The frequency of eating warm meals and frequent consumption of snacks and daily washing/showering was recorded. These behaviours were measured with seven alternatives varying from 3–4-times a day or more frequently to less than twice a month or never. Smoking and use of snuff, alcohol and drug experimenting were measured with three response alternatives: 'never used', 'tried once' and 'used several times'.

Behaviours were dichotomized into 'favourable' and 'unfavourable' based on the recommendations commonly given in Finland. 'Favourable' behaviours included: at least twice daily for tooth brushing with fluoride toothpaste, twice daily for eating warm meals, eating snacks less than daily; at least three times daily for use of xylitol products; less than daily for eating sweets, drinking soft drinks and consuming snacks, not more than once a week for drinking sports drinks and never used for smoking, snuff, drugs and alcohol.

Knowledge was evaluated by opinions about the following statements: 'A person should brush his/her teeth twice a day'; 'A person can prevent caries lesions by using fluoride toothpaste'; 'To ensure a sufficient supply of fluoride, one has to brush one's teeth with fluoride toothpaste at least twice a day'; 'A person can prevent caries lesions by using xylitol products after meals'; and 'A person can reduce the risk of developing new caries lesions by omitting one sweet snack a day'. The Likert-like reply alternatives were scaled as 'totally agree', 'partially agree', 'partially disagree' and 'totally disagree'. Knowledge was studied as the sum score of these statements.

The attitudes studied were related to tooth brushing or caries. The children were asked whether they thought that tooth brushing is important for the prevention of caries or tooth discolouration; for a fresh feeling in the mouth; for better looks; for fresh breath; for a healthy gingiva; or for acceptance by parents or friends. They were also asked whether they thought that tooth brushing is important before going to school, visiting a dentist, participating in sports/hobbies, going to a disco or meeting a girl/boyfriend or best friend. Attitudes were measured using 4-point Likert-like scaled questions, with alternatives varying from 'very important' to 'not at all important'. Attitudes were studied as factor sums based on earlier studies.[16,17]

To ease the interpretation, since knowledge and attitude sum scores all had different scales (different number of items), all sum scores were scaled to have a range of 0–18, 18 being the best.

The study protocol also including ethical aspects was approved by the Welfare Division and by the Education Division, City of Turku (no: 11031-2011).

Statistical methods

Differences in oral health-related habits according to gender and self-perceived presence of oral symptoms were evaluated with cross-tabulations and χ^2 -tests. Differences in sum scores of knowledge and attitudes according to gender and self-perceived presence of oral symptoms were evaluated with the Mann-Whitney U-test. A logistic regression model with manual backward elimination was conducted with self-perceived oral symptoms as a dependent variable. As independent variables, the initial model included all behaviours with statistically significant bivariate associations with self-perceived oral symptoms and interaction terms between behaviours and gender. The final model included those main effects and interaction terms for which the p -value was significant (< 0.05). Statistical analyses were conducted using SPSS 19.0 (SPSS, Chicago, IL) software.

Results

Significant differences between girls and boys were found in the performance rate of several oral health-related habits (Table 1). More girls than boys brushed their teeth twice a day and used xylitol products at least three times a day. Girls also used sports or soft drinks and had experimented with smoking less frequently than boys. These differences were statistically significant. Flossing was rare in both groups. Girls reported more often than boys that tooth brushing is important for social situations and for health and appearance. These attitude differences between girls and boys were statistically significant (Table 2).

The majority of respondents (61.7%) did not report any self-perceived oral symptoms (Table 3). The most commonly experienced oral symptom was gingival bleeding and the second most frequent was tooth ache. Girls reported more often than boys of the individual oral symptoms investigated. Only calculus formation was reported more often by boys. The differences were statistically significant only in gingival bleeding (more frequent among girls than boys) and calculus (more frequent among boys than girls).

Those reporting no oral symptoms were more likely to have beneficial habits related to tooth brushing, smoking or consumption of snacks, sweets and soft drinks than those who reported symptoms (Table 4). Considering xylitol use, the association was surprisingly the opposite. Knowledge and attitudes were not associated with perceived oral symptoms (Table 5). The results of logistic regression analyses showed that the association of health habits and perceived oral symptoms did not differ between boys and girls (all two-factor interaction terms were non-significant). The factors/habits remaining in the final model were tooth brushing, smoking and consumption of snacks and xylitol (Table 6).

Table 1. Percentages of children with healthy oral health-related habits and p -values (χ^2 -test) for differences between girls and boys.

	All ($n = 588$)	Girls ($n = 290$)	Boys ($n = 289$)	p
Tooth brushing at least 2x day	77.6	85.5	71.0	<0.001
Flossing at least 1x day	12.1	14.0	10.3	0.193
Warm meal at least 2x day	87.3	86.9	87.8	0.743
Xylitol products at least 3x day	31.8	37.5	27.1	0.008
Sweets less than daily	82.7	83.7	81.5	0.473
Soft drinks less than daily	72.8	78.5	65.6	0.001
Sports drinks not more than 1x week	89.4	94.0	84.9	<0.001
Snacks less than daily	67.5	69.1	65.3	0.328
No smoking/snuff	90.0	93.4	87.0	0.010
No alcohol	79.3	81.5	77.2	0.207
No drugs	99.3	100.0	98.9	0.080
Daily washing/showering	71.9	71.0	72.2	0.751

Table 2. Mean values of knowledge sum scores and attitudinal factor sums.

	All ($n = 588$)	Girls ($n = 290$)	Boys ($n = 289$)	p
Knowledge sum	11.6	11.5	11.6	0.601
Importance of brushing for social situations	13.6	14.5	12.7	<0.001
Importance of brushing for health and appearance	15.7	16.2	15.3	<0.001
Importance of tooth brushing for acceptance	12.8	13.0	12.6	0.283

Separately for boys and girls, scale 0–18, 0 = the worst, 18 = the best, P: Mann-Whitney U-test.

Discussion

The majority of the study subjects perceived their oral health status as good, with no reported oral health problems and symptoms. More than one third of the subjects did, however, report symptoms, which clinically means a significant proportion of the age cohort. Those reporting beneficial oral health habits reported clearly fewer oral health problems. Overall, girls had higher percentages of the investigated individual oral health promoting habits than boys. This agrees with previous studies showing that girls are often more concerned about oral health and general health issues than boys.[10–12] Healthy habits but neither good knowledge nor beneficial attitudes associated significantly with a lack of oral health symptoms. The results suggest that, for improved promotion of oral health, additional efforts should be aimed at translating knowledge into action.

A somewhat positive tendency with an increase in the percentage of Finnish children brushing twice daily has been found over the years in WHO-based studies.[18] There are still challenges with the overall low frequencies found, especially among Finnish boys. Tooth brushing twice a day was found in our study to be clearly more frequent than in earlier Finnish studies.[9–11,15] The present high percentages are comparable

Table 3. Percentages of children according to their current perceived oral health symptoms and p -values (χ^2 -test) for differences between girls and boys.

	All ($n = 588$)	Girls ($n = 290$)	Boys ($n = 289$)	p
Tooth-ache	12.6	14.5	10.7	0.173
Tooth decay	5.4	5.9	4.8	0.586
Bleeding	23.3	26.9	18.7	0.019
Gingivitis	3.9	4.8	2.8	0.195
Calculus	8.2	5.9	10.4	0.047
None of the above	61.7	59.3	64.0	0.244

Table 4. Percentages of children with beneficial oral health-related habits according to perceived presence of oral symptoms (χ^2 -test).

	No symptoms ($n = 360$)	Some symptoms ($n = 228$)	p
Tooth brushing at least 2x day	81.2	72.8	0.017
Flossing at least 1x day	13.4	10.0	0.228
Warm meal at least 2x day	88.8	85.0	0.181
Xylitol products at least 3x day	27.5	38.7	0.005
Sweets less than daily	85.2	78.8	0.045
Soft drinks less than daily	75.9	66.8	0.017
Sports drinks not more than 1x week	89.2	89.7	0.864
Snacks less than daily	72.1	60.4	0.003
No smoking/snuff	92.4	86.2	0.016
No alcohol	81.6	75.8	0.092
No drugs	99.7	98.6	0.136
Daily washing/showering	73.0	70.2	0.461

Table 5. Mean values of knowledge and attitude sum scores according to perceived presence of oral symptoms (Mann-Whitney U-test).

	No symptoms (n = 360)	Some symptoms (n = 228)	p
Knowledge sum	11.7	11.5	0.528
Importance of brushing for social situations	13.5	13.8	0.546
Importance of brushing for health and appearance	15.7	15.8	0.952
Importance of brushing for acceptance	12.8	12.8	0.628

Table 6. Results of the final logistic regression model for a lack of perceived oral symptoms.

	OR	95% CI	p
Tooth brushing at least 2x day (=1) vs less often (=0)	1.66	1.09–2.53	0.018
Xylitol products at least 3x day (=1) vs less often (=0)	0.60	0.41–0.87	0.007
Snacks less than daily (=1) vs more often (=0)	1.59	1.10–2.29	0.013
Never smoked/used snuff (=1) vs have smoked/used (=0)	2.20	1.24–3.91	0.007

to the top results from Western-Europe and the other Nordic countries.[9–11,18] Daily flossing was, however, reported rarely in the present boys and girls. Similar low flossing rates have been observed even among adults.[19]

The frequent consumption of sugar containing products such as sweets and soft drinks is indicative of a higher level of caries as well as failure of caries control.[7] In several European countries, the consumption of sugar products is more frequent than in Finland.[20,21] The frequency of sugar containing products in this study population seemed to be at the same level as previously reported among Finnish children.[14,15] Sweets and soft drinks are not available for purchase in the vending machines of the study schools, supporting the role of the school environment for oral health promotion.

The frequent use of xylitol chewing gum in relation to perceived oral symptoms did not show expected results. This may be due to over-reporting of xylitol use in subjects with oral symptoms, an increase in xylitol use when symptoms are observed or possibly a misconception that xylitol use substitutes tooth brushing. Thus, there still seems to be a need to clarify the role of xylitol vs mechanical cleaning using fluoride-containing toothpaste in caries prevention. It is also possible that combining the reported symptoms related to dental caries and gingival health into one outcome may have confounded the benefits derived from the different health behaviours. For example, the brushing behaviour will impact both gingival and dental health, whilst chewing gum is likely to impact more on dental caries than gingival health.

Our results about smoking agree with other national studies.[22] Smoking experimenting had started in the present age-group, supporting the concept that anti-tobacco efforts should be targeted at even younger age groups. The results of logistic regression suggested that, of the studied habits 'having never smoked/used snuff' had the strongest association with lack of perceived oral symptoms. In another study of an adult

population, smoking was shown to be significantly associated with a high incidence of reported caries and bleeding gums.[23]

The findings on the oral health habits studied give no suggestion or any explanation for the slightly higher DMFT average of the study area than the rest of the country. Acquired health knowledge and beneficial attitudes were not associated with the absence of oral health symptoms. The results, thus, suggest that increased information availability as such in a population with a high brushing frequency is not enough for improvement of overall perceived oral health. Additional means of health promotion, for example national or school level interventions, are needed,[24] besides the extensive practices already undertaken. Poor habits are also a potential risk for future caries.[25] Further research is needed to design and evaluate oral health promotion programs and their targeting.

Complex and interdependent relationships have been found between knowledge, beliefs, attitudes and behaviour.[17,26] Many studies have shown that co-operation with the children's families is important[27] and effective.[28] However, children and adolescents have a key role for their own health[29,30] and the significance of children as their own actors will increase over time as the parents' influence decreases. The present results may also indicate that early targeted health promotion programmes are needed to influence individuals and their social networks, so that information is translated into action and regular healthy habits are taken up early.[29]

In this study, the response rate was excellent and gender distribution was equal. The school-based approach to data collection probably explained the very high response rates obtained in this study. The questions included in this study were comparable and similar to questionnaires[9,13–15] used in earlier international and national studies. The clear and concise questionnaires increased the feasibility and the pre-tested questions increased the validity and reliability of the study. The commonly known under- or over-estimation in self-reporting of bad habits as well as favourable habits may, however, distort and influence the results to some extent. Additionally, the lack of clinical information may cause limitations to the interpretation of the present findings.

The present findings suggest that there are some gender-related differences in oral health habits, attitudes as well as perceived oral symptoms in 12-year-olds. There seems, however, not to be gender differences in relation to knowledge or the association of health habits with perceived oral symptoms. Thus, it is important to maintain health promoting efforts at schools at the general population level, but new innovative strategies to implement guidelines are needed to increase their effect in a population with a relatively high standard of oral health. General efforts in health promotion should run in parallel with efforts aimed and tailored to meet individual needs.

Acknowledgement

We are grateful for the co-operation of the pupils and the staff of Turku schools participated in the study.

Disclosure statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

References

- [1] A Nordic project of quality indicators for oral health care. In: Nihtilä A, editor. THL National Institute for Health and Welfare. 2010. THL—Report 32/2010. ISBN 978-952-245-328-0 Helsinki, Finland; 2010.
- [2] Tanner T, Kämppi A, Pääkkilä J, Patinen P, Rosberg J, Karjalainen K, et al. Prevalence and polarization of dental caries among young, healthy adults: Cross-sectional epidemiological study. *Acta Odontol Scand* 2013;71:1436–1442.
- [3] Widström E, Järvinen S. Caries prevalence and use of dental services in Finnish children and adolescents in 2009. *Ohdm* 2011;10:185–92.
- [4] Fejerskov O. Changing paradigms in concepts on dental caries: consequences for oral health care. *Caries Res* 2004;38:182–191.
- [5] Shaffer JR, Polk DE, Feingold E, Wang X, et al. Demographic, socioeconomic, and behavioral factors affecting patterns of tooth decay in the permanent dentition: principal components and factor analyses. *Community Dent Oral Epidemiol* 2013;41:364–73.
- [6] Mattila ML, Rautava P, Paunio P, et al. Caries experience and caries increments at 10 years of age. *Caries Res* 2001;35:435–441.
- [7] Hietasalo P, Tolvanen M, Seppä L, et al. Oral health-related behaviors predictive of failures in caries control among 11-12-yr-old Finnish schoolchildren. *Eur J Oral Sci* 2008;116:267–271.
- [8] Mattila ML, Rautava P, Jaakkola S, et al. Childhood caries is still in force: A 15-year follow-up. *Acta Odontol Scand* 2008;66:189–192.
- [9] World Health Organization 2008. Health Policy for children and adolescent. Inequalities in young people's health. Health behaviour in school-aged children. International report from the 2005/2006 survey. Child and Adolescent Health Research Unit. Geneva: World Health Organization 2008;5:97–101.
- [10] Kuusela S, Honkala E, Kannas L, et al. Oral hygiene habits of 11-year-old schoolchildren in 22 European countries and Canada in 1993/1994. *J Dent Res* 1997;76:1602–9.
- [11] Maes L, Vereecken C, Vanobbergen J, Honkala S. Tooth brushing and social characteristics of families in 32 countries. *Int Dent J* 2006;56:159–167.
- [12] Savolainen J, Suominen-Taipale AL, Uutela A, et al. Sense of coherence associates with oral and general health behaviours. *Community Dent Health* 2009;26:197–203.
- [13] Rautava P, Sillanpää M. The Finnish Family Competence Study: knowledge of childbirth of nulliparous women seen at maternity health care clinics. *J Epidemiol Community Health* 1989;43:253–60.
- [14] Poutanen R, Lahti S, Hausen H. Oral health-related knowledge, attitudes, and beliefs among 11 to 12-year-old Finnish schoolchildren with different oral health behaviors. *Acta Odontol Scand* 2005;63:10–16.
- [15] Tolvanen M, Lahti S, Hausen H. Changes in toothbrushing frequency in relation to changes in oral health-related knowledge and attitudes among children – a longitudinal study. *Eur J Oral Sci* 2010;118:284–289.
- [16] Tolvanen M, Lahti S, Poutanen R, Seppä L, Pohjola V, Hausen H. Changes in children's oral health-related behavior, knowledge and attitudes during a 3.4-yr randomized clinical trial and oral health-promotion program. *Eur J Oral Sci* 2009;117:390–397.
- [17] Tolvanen M, Lahti S, Miettunen J, Hausen H. Relationship between oral health-related knowledge, attitudes and behavior among 15-16-year-old adolescents: a structural equation modeling approach. *Acta Odontol Scand* 2012;70:169–176.
- [18] Social determinants of health and well-being among young people. Health Policy for Children and Adolescents, No. 6. In: Currie C, Zanotti C, Morgan A, Currie D, de Looze M, Roberts C, et al., editors. Health Behaviour in School-aged Children (HBSC) study: international report from the 2009/2010 survey. Copenhagen: WHO Regional Office for Europe; 2012.
- [19] Vehkalahti M, Knuutila M. Oral self-care. In: Suominen-Taipale AL, Nordblad A, Vehkalahti M, Aromaa A, editors. Oral Health in the Finnish Adult Population: Health 2000 Survey, 95th edn. Helsinki: National Public Health Institute; 2008. p. 25–29.
- [20] Ruottinen S, Karjalainen S, Pienihäkkinen K, Lagström H, Niinikoski H, Salminen M, et al. Sucrose intake since infancy and dental health in 10-year-old children. *Caries Res* 2004;38:142–148.
- [21] Vereecken C, Ojala K, Delgrande Jordan M. Eating habits. In: Currie C, Roberts C, Morgan A, Smith R, Settertobulte W, Samdal O, et al. editors. Young people's health in context Health Behavior in School-aged children (HBSC) study: international report from the 2001-2002 survey. Copenhagen: WHO Regional Office for Europe; 2004. p.110–119.
- [22] THL National Institute for Health and Welfare (2013): Smoking results of School Health Promotion Study 2000-2011. Available in Finnish at: www.thl.fi/attachments/kouluterveyskysely/Tulokset/Tulokset_aiheittain/kouluterveyskysely_tupakointi/nuuska/alkoholi_kysymyskohtaiset.xls
- [23] Tanner T, Pääkkilä J, Karjalainen K, et al. Smoking, alcohol use, socioeconomic background and oral health among young Finnish adults. *Community Dent Oral Epidemiol* 2015;43:406–14. doi:10.1111/cdoe.12163. [Epub ahead of print].
- [24] Kankaanpää R, Tolvanen M, Anttila J, Lahti S. Associations between school's guidelines and pupils' smoking and sweet consumption. *Community Dent Health* 2014;4:234–239.
- [25] Mattila ML, Rautava P, Sillanpää M, Paunio P. Caries in five-year-old children and associations with family-related factors. *J Dent Res* 2000;79:875–881.
- [26] 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 Dent Health* 1993;10:397–404.
- [27] Mattila ML, Rautava P, Ojanlatva A, et al. Will the role of family influence dental caries among seven-year-old children? *Acta Odontol Scand* 2005;63:73–84.
- [28] Poutanen R. Boys and girls as health-promoting actors – determinants of oral health-related lifestyle among 11- to 12-year-old schoolchildren. *Acta Universitatis Ouluensis D Medica* 942. Oulu: University of Oulu 2007.
- [29] Mattila ML, Rautava P, Aromaa M, et al. Behavioural and demographic factors during early childhood and poor dental health at 10 years of age. *Caries Res* 2005;39:85–91.
- [30] Christensen P. The health-promoting family: a conceptual framework for future research. *Soc Sci Med* 2004;59:377–387.