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Do life- or school-satisfaction and self-esteem indicators explain the oral hygiene habits of schoolchildren?

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Abstract – *Objectives:* The aim of this study was to ascertain how frequently toothbrushing and flossing are practiced among schoolchildren in Kuwait and whether life- and school-satisfaction and self-esteem indicators are associated with oral hygiene habits. *Methods:* A sample of 2312 schoolchildren between 11 and 13 years old filled out a structured questionnaire anonymously in school classrooms during 2002 and 2003. For this study, nationally representative samples of children were drawn from all six governorates of Kuwait. Only government schools were included. The questionnaire of the Health Behaviour in School-Aged Children Study was used in this study after it was modified to suit Kuwait. A chi-squared test and logistic regression model were used for analyzing the data. *Results:* Over half of the pupils reported brushing their teeth more than once a day; girls reported brushing more frequently than boys did. One-fifth of the pupils did not brush their teeth even on a daily basis. The life- and school-satisfaction and self-esteem indicators were associated with more-than-once-a-day toothbrushing frequency. The strongest predictors for recommended brushing were: feeling very happy (OR 2.0, 95% CI 1.38–2.77), feeling that other pupils always accept him/her (1.5; 1.16–2.02), never/sometimes feeling lonely and feeling that it is very easy to make friends (1.4; 1.06–1.94). The summary variables of life-satisfaction, school-satisfaction and self-esteem seemed to be strongly associated with brushing. Dental floss was never used by 45% of the children, weekly by 18% and daily by 17%; 20% did not even know what dental floss was. *Conclusions:* Among intermediate schoolchildren in Kuwait, oral hygiene practices were far behind the international recommendations. Special emphasis should be placed on children who have personal problems with their life, school and self-esteem.

Key words: Adolescence; flossing; Kuwait; toothbrushing

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Of all oral hygiene practices, toothbrushing is the most important, twice-a-day frequency being accepted as the international recommendation (1–3). It is not possible, however, to make all surfaces of all teeth plaque-free with toothbrushing alone; thus in addition, regular use of dental floss is universally recommended (3, 4).

Among the schoolchildren in different countries the difference in toothbrushing frequencies has been large, more-than-once-a-day brushing varying between 20% and 86% (5, 6). It has been shown that relatively stable patterns of toothbrushing are established already during childhood and adolescence and that individuals who brush their teeth more than once a day seem to have a more stable habit than those who brush less often (7, 8). It has previously been reported that females brush their teeth consistently more often than males do and that the recommended brushing frequency becomes more common with better

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school performance of the child or higher socio-economic status of the family (5, 9–12). During adolescence, oral hygiene habits tend to remain stable (7, 8, 13) with parents still playing a dominant role (13), while peer group and school play a smaller role (14). Therefore the parental responsibility for children's oral health should be emphasized in oral health education – not only among preschoolers, but also among older children. When parents teach regular toothbrushing, they also transmit ideals of goal-directed behavior, enabling their children to maintain their oral health and to carry out their school duties (15). In addition, high toothbrushing frequency in adolescence has been shown to predict strongly the high educational level of these individuals, as they become adults (15).

Flossing has not been a commonly adopted practice among schoolchildren. In a previous study, in Canada and Norway, every fourth child reported to floss daily; but in most countries this proportion has been below 10% (5). In Kuwait, there are only a few reports concerning the oral hygiene habits of children, with nonrepresentative samples showing quite low brushing frequency (16, 17). In Muslim countries, as recommended by religious tradition, chewing sticks, Miswak or Siwak (twigs made from roots of the *Salvadora persica* tree) have, for centuries, been used on a regular basis to maintain oral hygiene. These sticks are commonly used in the Middle East, Asia and Africa (18). For reducing plaque interproximally and thus reducing gingivitis, Miswak, if used correctly, has been shown to be more effective than toothbrushing (19, 20).

The Dental Department of the Ministry of Health in Kuwait recently updated the preventive guidelines for trying to improve the oral health behavior of children. They have instructed that health education should be given annually to all the children in kindergartens and in primary schools, and for the teachers and parents of pupils (21). The chair-side oral hygiene instructions (including toothbrushing, use of fluoride toothpaste and flossing) are recommended to be given individually for all schoolchildren visiting school oral health clinics (21). However, proper implementation of the preventive strategy has not been possible, because of the great need for treatment due to dental caries among children (22) and due to the need for more manpower (23).

Self-esteem variables have been studied most often in connection with substance-use behavior (24). Some studies on the oral health behavior of adolescents have shown that in both boys and girls, self-esteem is strongly associated with toothbrushing frequency (25–27), but the locus of control (28) is associated positively with toothbrushing frequency only among boys (26). Self-concept also seems to play an important role in mediating changes in dental health behavior (26). Life- and school-satisfaction may be considered a domain-specific, subjective well-being construct that contributes to the overall subjective well-being and quality of life of young people (24). Data on how young people move through adolescence and factors that influence the success and difficulty with this transition should include indicators of health, e.g. feeling happy or feeling lonely (24). In the earlier studies, the content validity of the self-esteem variables has been found to be satisfactory (25–27). Sense of coherence has recently been shown to explain oral health and quality of life (29) as well as the toothbrushing frequency among adults (30). Life- and school-satisfaction variables, however, have not been studied earlier in relation to oral health behavior among adolescents.

While there is no comprehensive theory of the determinants of health behavior, these standardized life- and school-satisfaction and self-esteem indicators have been developed in the Health Behaviour in School-Aged Children (HBSC) study, a WHO Collaborative Study. The most relevant indicators included in the previously presented theories have been adopted in this project (31). Our study followed the HBSC protocol and included several variables that describe different personality and self-coherence factors; here these factors were considered as means of determining life- and school-satisfaction and self-esteem. Although such factors play an important role in behavioral change, they have not been broadly studied together with other traditional determinants of oral hygiene habits.

The HBSC study is a cross-national research project conducted in collaboration with the WHO Regional Office for Europe. The overall goals of the survey are to gain new insight into and to increase our understanding of health behaviors and lifestyles among young people in a social context, as well as to understand how young people perceive health and well-being itself (31). Findings from the HBSC surveys are used to inform and influence health promotion and health education policy and practice at the national and international levels. HBSC was initiated in 1982 by researchers from

four countries. The first cross-national survey was conducted in 1983/1984, and the second in 1985/1986. Since then data have been collected every 4 years using an accepted research protocol. The most recent survey was conducted in 2001/2002 with 39 participating countries and regions (32).

In Kuwait, no nationally representative samples or internationally tested approach and methodology have been used to obtain information on oral health behavior that would be comparable with other countries. The aim of this study was to ascertain how frequently toothbrushing and flossing were practiced by a nationally representative sample of the schoolchildren in Kuwait and whether life- or school-satisfaction and self-esteem indicators are associated with oral hygiene habits.

Materials and methods

Sampling

A nationally representative sample of schoolchildren from the fifth- and seventh-grades (11- to 13-year olds) from all six governorates (i.e. health authority regions) in Kuwait was drawn for this study. As the majority of the children in private schools are non-Kuwaitis and non-Arabs, only the government intermediate schools were included. A two-stage sampling process was adopted. Schools were randomly selected (using random numbers) from a list provided by the Research Department of the Ministry of Education. The individual classes were sampling clusters, and all pupils in each class were invited to participate. Principals selected two to three classes from each school as being convenient for teaching and examination timetables. Of the total number of government schools at the intermediate level 78 were for boys and 86 were for girls with 1536/1506 classes and 46 704/39 871 pupils, respectively (33). Each class had about 30 children, with classes at the girls' schools being slightly smaller than those at the boy's schools. Altogether 2556 pupils were invited to take part in this study. The sampling process followed the recommendations of the HBSC study protocol, and the sample size-estimation was calculated from previous HBSC studies (31). A total of 24 (11 for boys and 13 for girls) schools participated in the study: in the fifth-grade 17 schools and in the seventh-grade 19 schools. For the fifth-grade, 54% (37 from 68) of the classes at the schools participated; and for the seventh-grade, 62% (47/76). Most pupils were present at the time the questionnaire was completed; but in some classes, one to three pupils were absent and were not approached afterwards.

Study instrument

The questionnaire for the Health Behaviour in School-Aged Children (HBSC), a WHO Collaborative Study, was used in this study after it was modified to suit Kuwait. The mandatory HBSC questions concerning alcohol use and sexual behavior were omitted, as they were considered inappropriate topics in a Muslim country (34). The questionnaire was translated from English to Arabic and then back-translated by two independent translators. A pilot study had been conducted in two areas during April 2002, resulting in minor modifications concerning the accuracy of the language of some questions. The aim of the pilot test was to confirm that pupils in Kuwait, who rarely fill out questionnaires, could understand and answer this kind of questionnaire. Protocol for the HBSC Study for 1997/1998 (31) was used with the permission of the international coordinator of the project.

Several HBSC survey countries have conducted separate studies to improve the test–retest reliability and validity of different parts of the questionnaire; most of the studied items had adequate validity and satisfactory reliability (35–38). When the questions concerning toothbrushing and its traditionally studied determinants were tested among adolescents in Finland, reliability was found to be satisfactory (7).

Our study was conducted from October to December 2002 and in October 2003. Children filled out a questionnaire in their school classrooms during a regular class session. About 45 min was allocated for this; teachers supervised the occasion according to the instructions given by the researchers. The aim was to have the children fill out the questionnaire anonymously and independently. Teachers could help only if there were difficulties in understanding some questions. Informed consent was asked from the parents of the fifth-grade pupils on a written informed consent form explaining the study. The headmasters of the schools felt that seventh-graders are old enough to give consent themselves. The classroom teachers informed the pupils about the purpose of the study and that participation was voluntary. The supervising teacher completed a classroom information sheet for each participating classroom, which provided information on class size and absentees. After completing, the questionnaire each pupil placed it

in a blank envelope and sealed it. When schools had completed the questionnaires, a driver from the university collected the forms.

Variables

The questionnaire included 84 structured questions, of which 57 were mandatory core or focus questions that were asked in all countries participating in the HBSC study (31). The rest of the questionnaire was country-specific, and each country could decide what kind of, and how many questions to include. The main areas covered in the questionnaire were health (self-rated health, self-rated fitness and experience of perceived symptoms), health behaviors (smoking, physical activity, sedentary leisure activity, eating habits and oral hygiene habits), social relationships and demographic characteristics.

Toothbrushing frequency was determined by the question 'How often do you brush your teeth?' Five options were given – more than once a day, once a day, at least once a week but not daily, less than once a week, never. For bivariate analysis the answers were recoded in three categories (more than once a day, once a day, less than once a day), and for the logistic regression model in two categories (more than once a day, once a day or less often). Flossing frequency was determined by 'How often do you use dental floss?' Response alternatives were – daily, weekly, never, I don't know what floss is. In the analyses it was recoded into two categories – I use floss, I don't use floss.

The socio-demographic factors identified in this study were gender, grade, nationality (Kuwaiti, non-Kuwaiti Arab) and self-reported school performance. Socioeconomic status (SES) was measured by family economic status. The question concerning school performance was: 'In your opinion, what does your class teacher(s) think about your school performance compared to your classmates? He/she thinks I'm: very good, good, average, below average'. Family economic status was determined by the question, 'How well off do you think your family is?' The alternatives given were: very well off, well off, average, not very well off, not at all well off, don't know.

Life-satisfaction was measured by the following questions:

- Happiness: 'In general, how do you feel about your life at present? I feel very happy, I feel happy, I don't feel happy, I'm not happy at all.'
- Loneliness: 'Do you ever feel lonely? Very often, rather often, sometimes, never.'

School-satisfaction was measured by the following questions:

- Enjoy being with classmates: 'Do the pupils in your class enjoy being together? Always, often, sometimes, rarely, never.'
- Acceptability: 'Do other pupils accept you as you are? Always, often, sometimes, rarely, never.'
- Going to school boring: 'How often do you think that going to school is boring? Very often, often, sometimes, rarely, never.'
- Skip classes: 'How often did you skip classes or school this term? 'Never, sometimes.'

Self-esteem was measured by the following questions:

- Nervousness: 'In the last 6 months, how often have you felt nervous? About every day, more than once a week, about every week, about every month, rarely or never.'
- Self-confidence: 'How often do you feel self-confident? Always, often, sometimes, rarely, never.'
- Body image: 'Do you think your body is: Much too thin, a bit too thin, about the right size, a bit too fat, much too fat, I don't think about it?'
- Appearance: 'Do you think you are: Very good looking, quite good looking, about average, not very good looking, not at all good looking, I don't think about it?'
- Making new friends: Is it easy or difficult to make new friends? Very easy, easy, difficult, very difficult.

To avoid categories with only a few cases, recoding of the independent variables was based on their frequency distributions.

Implementation of the study

Permission to conduct the study in the Kuwaiti government schools was applied for from the Ministry of Education and regionally from the educational directors of the districts. The Research Ethical Committee of the Faculty of Dentistry, Kuwait University, gave ethical permission for the study. When permissions were granted, the headmasters of the selected schools were approached by the principal investigator (S.H.) and an Arabic-speaking associate (N.S.). The aims and the procedure of the study were explained. Five schools refused to participate because exams were being held or the headmasters thought that the questionnaire was too difficult for their pupils. Replacements were selected randomly from the same governorate.

The study was interrupted by the war in Iraq at the beginning of 2003, during which time data from

the questionnaires already returned were entered and checked. Three schools had selected children who were too young for the study and who left too many questions unanswered. Those schools were omitted from the final sample and replacements were selected. However, because of the war and its disruptions to the school timetable, new schools were approached the following October, at the same time as the previous year. The final sample was 2312 students, i.e. 93% of all students in the selected classes. About half of the sample were boys and half were girls (51/49%). The fifth-grade pupils comprised 44% and the seventh graders 56% of the sample. The mean age of the pupils was 11.9 years (SD ±1.3). The majority (84%) of the respondents were Kuwaitis, while the rest were from other Arab countries.

Statistical analysis

Data were entered and analyzed by using the SPSS statistical package versions 11–13 (SPSS Inc., Chicago, IL, USA). Variation in the distributions of toothbrushing frequency and use of dental floss was analyzed by cross-tabulations according to socio-demographic, SES, life- and school-satisfaction and self-esteem factors.

Cronbach's alpha was used as the reliability coefficient for measuring inter-correlations of the individual indicators of life-satisfaction, school-satisfaction and self-esteem. Statistical significance was measured with the chi-squared test. A logistic regression model was used to estimate the odds ratios (OR) and their confidence intervals (95% CI) for brushing more often than once a day and flossing regularly according to those socio-demographic, SES, life- and school-satisfaction and self-esteem factors that were statistically significant in bivariate analyses. For the final logistic model, only the statistically significant explaining indicators in the two separate multivariate analyses were included. When combined to this model, some of those variables were not anymore significant, thus the non-significant variables were dropped out from the model one by one (stepwise), leaving only the significant ones into the final model.

Three separate summary variables were formed, for life-satisfaction (range: 0–2), for school-satisfaction (0–4), and for self-esteem (0–5), by giving equal weight to each of their component variables. One or two highest positive categories of the component variable were categorized as 1 and the other values as 0; finally, all the component variable values were added together.

Correlation of toothbrushing and flossing with a summary score variable of life- and school-satisfaction and self-esteem was analyzed by Pearson's coefficient.

Results

The majority (59%) of the pupils reported brushing more than once a day. However, one-fifth of the pupils did not brush their teeth, even on a daily basis. Girls reported brushing more frequently than boys did ($P = 0.000$; OR 1.9, 95% CI 1.52–2.25) and the seventh-graders less often than the fifth-graders ($P = 0.000$; 0.7, 0.55–0.82) (Table 1). Those who thought that their family was very well off ($P = 0.000$; 1.8, 1.37–2.23) and those who performed very well at school ($P = 0.000$; 1.8, 1.41–2.35) brushed more frequently than the others, and the Kuwaitis brushed more often than non-Kuwaitis ($P = 0.006$; 1.3, 1.00–1.67).

Many life- and school-satisfaction and self-esteem indicators were associated with more-than-once-a-day toothbrushing frequency (Table 2). When all the significant indicators (based on the bivariate analyses) were analyzed the logistic model, the strongest indicators for the recommended brushing habit were – feeling very happy (OR 2.0, 95% CI 1.38–2.77), feeling that other pupils always accept him/her (1.5, 1.16–2.02), never skipping classes at school (1.5, 1.07–2.22), feeling that it is very easy to make friends (1.4, 1.06–1.95) and never/sometimes feeling lonely (1.4, 1.03–1.82/1.4, 1.05–1.83).

Finally, when only the statistically significant socio-demographic, SES and life-/school-satisfaction and self-esteem indicators were used, family well off, nationality and feeling loneliness no longer appeared to be significant indicators and were thus removed from the final logistic model. According to the final model, the strongest indicators for the recommended toothbrushing frequency were – feeling very happy (2.4; 1.63–2.89), female gender (2.0; 1.65–2.42) and feeling very good looking (1.9; 1.45–2.41) (Table 3). Correlation coefficient of the summary score of life- and school-satisfaction and self-esteem was 0.21 ($P < 0.001$).

Dental floss was never used by 46%, weekly by 18% and daily by 17% of the children. Every fourth child did not know what dental floss was. The pupils who reported brushing more than once a day also reported using floss daily clearly more often than the others did (42% versus 24%; $P = 0.000$). The Kuwaiti pupils and those with very good school

Table 1. Recommended oral hygiene habits among intermediate schoolchildren in Kuwait in 2002/2003 according to socio-demographic, SES and school performance variables

Variables	Toothbrushing >1/day (%)	*P*-value[a]	OR[b]	95% CI[b]	Regular flossing (%)	*P*-value[a]	OR[b]	95% CI[b]
Gender								
Boy	50		1.0		34		1.0	
Girl	67	0.000	1.9	1.52–2.25	35	0.414	1.1	0.88–1.30
Grade								
5th	64		1.0		36		1.0	
7th	54	0.000	0.7	0.55–0.82	33	0.137	0.9	0.78–1.16
Nationality								
Non-Kuwaiti	52		1.0		27		1.0	
Kuwaiti	60	0.006	1.3	1.00–1.67	36	0.000	1.7	1.28–2.29
Family financial status								
Average/below average/								
Don't know	52		1.0		29		1.0	
Well-off	48		0.9	0.69–1.27	32		1.2	0.84–1.51
Very well-off	66	0.000	1.8	1.37–2.23	37	0.012	1.3	1.10–1.68
School performance								
Average or below	48		1.0		30		1.0	
Good	50		1.4	1.11–1.88	28		0.7	0.53–0.90
Very good	63	0.000	1.8	1.41–2.35	38	0.000	1.6	1.25–2.18

[a]Bivariate analyses (chi-squared test).
[b]Multivariate analyses (logistic regression).

performance flossed more frequently than the others (Table 1). There were no differences between boys and girls, and the fifth-graders flossed only slightly more often than the seventh-graders did. When life-/school-satisfaction and self-esteem indicators were considered, feeling very happy, feeling that it is easy to make friends ($P = 0.000$) and feeling that other pupils always accept him/her ($P = 0.002$) were associated positively with the use of dental floss. In the final logistic model, only the following indicators were significantly associated with flossing: feeling that it is easy to make friends (OR 1.7, 95% CI 1.28–2.20), Kuwaiti nationality (1.6; 1.24–2.12) and very good school performance (1.4; 1.05–1.73). Correlation coefficient between use of dental floss and summary score of life- and school-satisfaction and self-esteem was 0.08 ($P < 0.001$).

Cronbach's alpha for life-satisfaction components was 0.42, for school-satisfaction it was 0.40 and for self-esteem 0.29. The Cronbach's alpha for self-esteem even decreased when excluding any of the items of the sum score. The summary variables of life- and school-satisfaction and self-esteem were all strongly associated with toothbrushing frequency among both boys and girls (Fig. 1).

Discussion

This study reports the first nationally representative data on health-related behavior among schoolchildren in Kuwait. The main finding was that toothbrushing is not a health habit that is well-adopted by schoolchildren in Kuwait. Half of the boys and every third girl did not brush according to recommendations, i.e. twice a day. A previous study among sixth-graders in Kuwait gave slightly lower figures for frequency, and female university students reported brushing more often than intermediate schoolchildren did, but for boys brushing was at the same level (17, 39). In another Middle-Eastern country, Saudi Arabia (40), toothbrushing frequency was reported to be lower than in Kuwait: 44% of the 12-year olds brushed their teeth twice a day, and even fewer in Jordan (41), where only one third brushed their teeth twice a day. In Europe, Hungary, Poland, Italy, Ireland, Spain and Portugal, the recommended toothbrushing was similar to the level in Kuwait (6). The highest proportions (80–84%) were reported in Switzerland, Sweden and Norway, and the lowest in Malta and Lithuania (22–39%). Earlier studies have confirmed that females brush their teeth more often than males and that the brushing frequency is higher with better school performance or higher socioeconomic status of the family (5, 9–12), which also was the case in Kuwait.

When the life- or school-satisfaction and self-esteem indicators were considered, the brushing frequency clearly differed between different groups. Pupils who did not feel happy, felt lonely

Table 2. Recommended toothbrushing frequency and regular flossing among intermediate schoolchildren in Kuwait according to life- and school-satisfaction and self-esteem indicators in 2002/2003

	Toothbrushing >1/day (%)	*P*-value[a]	OR[b]	95% CI[b]	Regular flossing (%)	*P*-value[a]	OR[b]	95% CI[b]
Life-satisfaction								
1. Happiness								
Not happy	43		1.0		32		1.0	
Happy	50		1.2	0.86–1.69	30		0.9	0.63–1.29
Very happy	68	0.000	2.0	1.38–2.77	39	0.000	1.4	0.97–1.95
2. Loneliness								
Often	51		1.0		34		1.0	
Sometimes	58		1.4	1.05–1.83	35		1.0	0.77–1.35
Never	64	0.000	1.4	1.03–1.82	35	0.964	1.1	0.82–1.45
School-satisfaction								
1. Pupils enjoy being together								
Sometimes/never	51		1.0		30		1.0	
Often	56		0.9	0.76–1.47	35		1.1	0.80–1.58
Always	63	0.000	1.0	0.78–1.37	36	0.061	1.1	0.80–1.44
2. Other pupils accept me								
Sometimes/never	50		1.0		29		1.0	
Often	56		1.2	0.89–1.68	33		1.0	0.75–1.45
Always	65	0.000	1.5	1.16–2.02	38	0.002	1.2	0.90–1.59
3. Going to school is boring								
Often	58		1.0		36		1.0	
Sometimes	53		0.8	0.64–1.11	31		0.9	0.65–1.13
Rarely/never	62	0.050	1.0	0.75–1.26	35	0.150	0.9	0.71–1.19
4. Skip classes								
Sometimes	47		1.0		36		1.0	
No	59	0.001	1.5	1.07–2.22	34	0.358	0.9	0.68–1.41
Self-esteem								
1. Nervous								
Daily	55		1.0		33		1.0	
Weekly	54		0.9	0.66–1.22	35		1.3	0.95–1.77
Rarely/never	61	0.023	1.0	0.74–1.28	35	0.761	1.1	0.85–1.49
2. Self-confident								
Sometimes/never	53		1.0		31		1.0	
Often	57		1.0	0.77–1.40	37		1.2	0.90–1.65
Always	62	0.002	1.1	0.86–1.43	35	0.091	1.2	0.91–1.52
3. Body image								
Too thin/fat	53		1.0		35		1.0	
Don't think about it	65		1.3	0.95–1.71	3		0.8	0.57–1.04
Right size	58	0.000	1.1	0.83–1.37	37	0.052	1.1	0.83–1.38
4. Appearance								
Average/not good looking	48		1.0		31		1.0	
Don't think about it	61		1.3	0.91–1.77	34		1.3	0.86–1.69
Quite good looking	54		1.1	0.81–1.46	35		1.1	0.87–1.61
Very good looking	69	0.000	1.6	1.17–2.10	37	0.090	1.6	0.91–1.63
5. Make friends								
Difficult	51		1.0		25		1.0	
Easy	54		1.0	0.76–1.39	35		1.6	1.13–2.15
Very easy	65	0.000	1.4	1.06–1.95	38	0.000	1.6	1.19–2.26

[a]Bivariate analyses (chi-squared test).
[b]Multivariate analyses (logistic regression).

often, felt that the other pupils did not accept him/her and felt that it is difficult to make friends were more prone to brush infrequently than other pupils were. In earlier studies, self-concept (high self-esteem and high internal locus of control) was found to be significantly correlated with toothbrushing frequency among adolescents (27) and also among adults (29, 30). Toothbrushing has not been shown to be a strongly health-related behavior (42), but the individuals who brushed their teeth regularly usually paid more attention to their personal hygiene and grooming than to their health, and also believed clean teeth to be part of good personal appearance (42, 43). Toothbrushing

Table 3. Recommended toothbrushing frequency among intermediate schoolchildren in Kuwait in 2002/2003 according to the different variables

	Toothbrushing >1/day	
	OR[a]	95% CI[a]
Gender		
Boy	1.0	
Girl	2.0	1.65–2.42
Grade		
5th	1.0	
7th	0.8	0.63–0.93
School performance		
Average or below	1.0	
Good	1.4	1.08–1.80
Very good	1.6	1.25–2.04
Happiness		
Not happy	1.0	
Happy	1.1	0.85–1.52
Very happy	2.4	1.63–2.89
Loneliness		
Often	1.0	
Sometimes	1.3	1.01–1.63
Never	1.2	0.97–1.57
Appearance		
Average/not good looking	1.0	
Don't think about it	1.5	1.11–1.97
Quite good looking	1.2	0.89–1.50
Very good looking	1.9	1.45–2.41

[a]Multivariate analyses

is strongly influenced by an individual's social behavior (43).

In this study as well as in previous ones, use of dental floss was rare (11, 44). Quite a large proportion of the children did not even know what floss was, which was also the case in many European countries (11). Adolescents who brush more than once a day have been found to use dental floss more regularly than those who brush less often (44), which is in accordance with the results of this study. Contradictory to this study, use of dental floss has shown no correlations with self-concept or with self-esteem/life-satisfaction (27). However, flossing has been reported to be well correlated with bathing frequency and toilet hygiene, i.e. suggested to be linked more to general cleanliness behavior than just to oral hygiene (44). According to this study, younger pupils used dental floss less frequently than older pupils did, which has also been reported in other countries (44, 45). Miswak habits were not asked in this study, because most people in Kuwait live in urban areas and the education status is high, toothbrushes are easily available in all shops and supermarkets, and people can afford to buy them. However, for some pupils, regular toothbrushing and use of dental floss might have been replaced by use of a Miswak. Nowadays in the Middle East, the Miswak is used mainly by men, by people from lower educational/occupational classes and by those living in rural areas (46).

Among schoolchildren, correlations between the self-reported data and objective measures in other studies have been found to be high (47). However, the accuracy of self-reports may be compromised, because some health behaviors are difficult to recall and some are so sensitive that the respondents may not want to report them. In addition, adolescents might purposely under-report or over-report some health behaviors, because they believe that

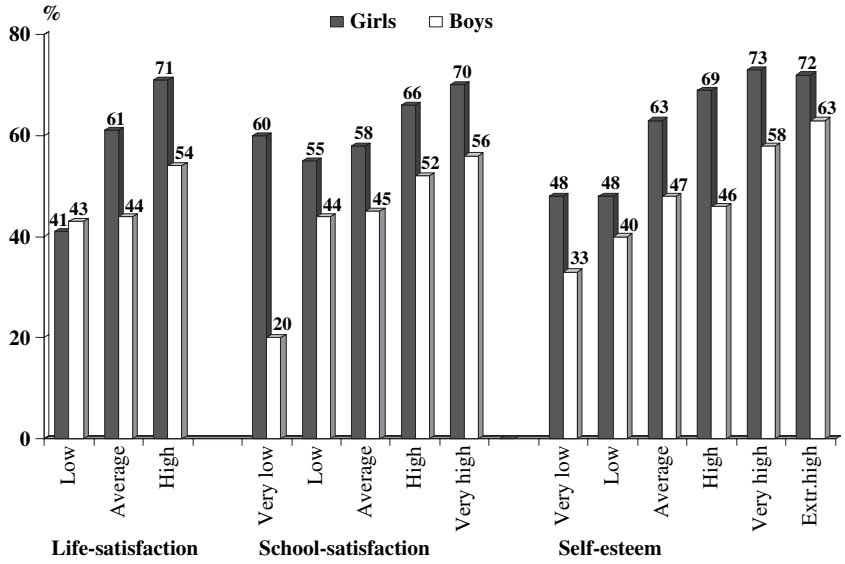

Fig. 1. Percentage of schoolchildren brushing their teeth more than once a day according to life-satisfaction, school-satisfaction and self-esteem summary variables by gender.

engaging in these behaviors is socially undesirable or desirable (47). Thus, some care must be taken when the results of this study are interpreted. Adolescents in Kuwait are not used to answer this long a questionnaire, but the pilot study revealed that they are able to fill it in. In the field of medicine in Kuwait, the Childhood Health Assessment Questionnaire has been used among rheumatoid arthritis patients, which reached high reliability and validity (48).

The intercorrelations of the different indicators of life-satisfaction ($n = 2$), school-satisfaction (4) and self-esteem (5) were quite low (Cronbach's alpha ranged from 0.29 to 0.42). This means that the content validity of these indicators is low, but it could also mean that they measure the different dimensions of these three domains. Therefore, the summary variable was created by giving equal weight (1 for the positive categories) to each of the component indicators. The associations between the recommended toothbrushing frequency and these three summary variables were very strong. The results indicate that these individual-based indicators seem to explain toothbrushing habits well. School oral health programs should probably focus more on those children who already have problems, who are not satisfied with their life and their school and who have low self-esteem. In the key message, health education should emphasize the positive individual issues and associate good oral hygiene with personal well-being, satisfaction and positive self-esteem.

Conclusions

Life- and school-satisfaction as well as self-esteem indicators seemed to be strongly associated with recommended toothbrushing and weakly with regular flossing. Children who are not satisfied with their life and school and who have low self-esteem should be the focus of oral health education. Personal well-being, life-satisfaction and positive self-esteem should also be emphasized by health educators as outcomes of good oral health behavior.

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