

ORIGINAL ARTICLE

Self-assessed dental health, oral health practices, and general health behaviors in Chinese urban adolescents

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Abstract

The objectives of this study were: to describe perceived dental health status and oral health-related knowledge, attitudes, and behavior in Chinese urban adolescents; to assess the associations of oral health variables with socio-economic status and school performance; and to analyse the relative effect of socio-behavioral risk factors on perceived dental health, perceived need for dental care, and experience of dental symptoms. A cross-sectional survey of 2662 adolescents was conducted in eight capital cities in China; the response rate was 92%. The study population was chosen by multistage cluster sampling and covered three age groups: 11, 13, and 15 years. Data on dental and general health were collected by self-administered questionnaires. Self-assessment of dental health of Chinese adolescents was generally good, only 12% of the students answered that their teeth were “poor” or “very poor”, and 9% claimed having “poor” or “very poor” gums. Eleven percent of participants said that other students made fun of their teeth; 24% of the respondents were dissatisfied with the appearance of their teeth, and 41% claimed that they had experienced toothache or symptoms during the previous 12 months. Positive attitudes towards dental care were found in all age groups; 67% of adolescents brushed their teeth at least twice a day and 48% of the students used fluoridated toothpaste. Only 26% of the students visited a dentist during the previous 12 months. In all, 6% of the adolescents had tried cigarette smoking at least once, while 41% reported having tasted alcohol drinks. Multivariate regression analyses showed that perceived dental health status and needs were associated with gender, age, unhealthy lifestyles, poor school performance, and socio-economic status. The establishment of school-based health promotion programs in China is urgently needed, and promotion of oral health lifestyles should be integrated with other general health actions.

Key Words: Adolescent, dental health, general health, lifestyles, oral health behavior, PR China

Introduction

Over the past two decades, dental caries prevalence in children has significantly declined in most developed countries [1]. The major causes of this reduction relate to changing living conditions and lifestyles, improved oral hygiene habits, effective use of fluorides, and implementation of school-based preventive oral care programs. However, dental caries prevalence rates are increasing rapidly in several developing countries, especially in countries where community-based preventive oral health programs are not established [1]. In addition, in many developing countries, significant proportions of children and youth have not adopted

appropriate self-care practices in relation to oral health [2–5].

In a life-cycle perspective, adolescence is a crucial stage for health and development of healthy lifestyles [6], meanwhile, policy-makers often tend to disregard youth as an important target age because of low mortality and morbidity rates [7]. Studies conducted in industrialized countries show that young people often have unhealthy lifestyles, particularly in relation to use of tobacco and alcohol, diet, physical activity, and personal hygiene [8–10]. Studies also indicate that oral health and general health have common risks and poor health may impact the quality of life [11–13]. Continuous improvement in oral health status may

therefore be based on the common risk factors approach, and targeting individuals in early adolescence may have an important impact on health later in life [1].

In the People's Republic of China, the results of the Second National Survey of Oral Health (1995–96) showed that the prevalence rate of dental caries was about 45% in 12-year-old children, the mean DMFT was 1.1, and untreated dental caries was a dominant component of the dental caries index [14]. Moreover, gingival health status and oral health habits of children seemed poor [2,14]. National surveys of oral health behavior in children have indicated that relatively few children perform regular toothbrushing with use of fluoridated toothpaste, have regular dental visiting habits, and seldom have received any oral health care instruction [2]. In addition to poor dental care habits, the important risk factors of dental caries in Chinese children relate to the frequent consumption of eating sugary foods [2]. The effect on dental caries prevalence of sugar consumption has been found in previous regional studies carried out in China [15,16] and in other countries of Asia, for example Thailand [3]. Although mass health education, such as the "Love-Teeth-Day" campaign, may have had some positive impact on oral health practices of the young Chinese, the reports available indicate that oral health promotion programs aimed at Chinese youth should be further strengthened [2,15,16].

Information is necessary on the pattern of oral health behavior in the target population in order to promote oral health effectively, including information about how oral health links with various factors, such as peers, tobacco, and alcohol use, dietary habits, physical exercise, body image, family structure, parental income, and education level [10–12,17–20]. The school environment [10,21] and school performance [22] are additional influential factors of lifestyle behavior of students. The objectives of this study were to describe the perceived dental health and oral quality of life, oral health-related knowledge, attitudes and behavior in Chinese urban adolescents, to assess the associations of oral health with socio-economic background and school performance, and to analyse the relative effect of socio-behavioral risk factors on perceived dental health, perceived need for dental care, and experience of dental symptoms.

Study population and methods

The study was carried out as a cross-sectional survey from February through March 2003. The study population was chosen as a multistage cluster sample and covered three age groups: 11, 13, and 15 years. At the first level of sampling, eight cities representative of urban centers of the nation were chosen (Beijing, Wuhan, Xian, Guangzhou, Shanghai, Lanzhou, Kunming, and Shenyang). One primary school and one secondary school were randomly selected in each

city to be surveyed at the second level of sampling, and then all students of the relevant ages in the school class were selected. The final sample comprised 2662 students, i.e. 948 students aged 11 years, 902 aged 13 years, and 812 aged 15 years, and the overall response rate was 92%.

The structured questionnaire used for collection of data was designed by the World Health Organization Global Oral Health Programme, Geneva, Switzerland, and included the following variables: (1) self-assessment of general health status, (2) self-assessment of oral health status and quality of life, (3) self-reported oral health behavior and lifestyles, (4) oral health knowledge and attitudes, (5) school performance, (6) students' spare time activities, and (7) family status and lifestyle of parents. The questionnaires were completed by the students themselves in classrooms, and school-teachers and dentists supervised the procedure. The questionnaire was originally formulated in English and then translated into Chinese. Its validity and reliability were assessed prior to implementation of the study. For testing the reliability, 20 students of each age group not covered by the survey completed the questionnaire twice. Three weeks after completion of the first questionnaire, these students completed the same questionnaire and the consistency rates in answers were over 80%.

Data from questionnaires were processed for analysis by means of the SPSS 12.0 system for Windows. All data were transferred to the WHO Collaborating Center for Community Oral Health Programs and Research, University of Copenhagen. Description and analysis of the data were carried out by frequency distributions. Several additive indices, based on sum scores, were constructed in order to study the associations between the socio-behavioral factors and perceived dental health and quality of life variables: (1) performance in school (scores 6~22), (2) relationship to friends (scores 3~10), (3) consumption of sugary drinks and foods (scores 8~32), (4) consumption of healthy foods (scores 5~20), (5) watching TV/PC (scores 2~12), (6) tobacco habits (scores 2~6), (7) alcohol habits (scores 4~17), (8) oral hygiene practices (scores 5~13), (9) general hygiene practices (scores 3~15), (10) knowledge about causes of dental disease (scores 0~6), (11) knowledge about prevention of dental disease (scores 0~6), (12) attitudes about dental care (scores 0~9), (13) perceived dental health status (scores 10~15), (14) perceived dental symptoms (scores 2~8), (15) perceived need for dental care (scores 0~6), (16) lifestyle of parents (tobacco, alcohol) (scores 2~8), and (17) education level of parents (scores 0~10). The scales were designed to fit the Guttman-scale model (23). In the final analysis, the various scales were then categorized empirically in the following way: low, moderate, or high. Bivariate frequency distributions were computed and differences in proportions were evaluated using the chi-square test. Spearman correlation coefficients were calculated to

Table I. The percentages of Chinese adolescents who reported certain dental health conditions according to age

	Age			
	11 years (n=948)	13 years (n=902)	15 years (n=812)	Total (n=2662)
Poor/very poor teeth	12.1	11.8	11.6	11.9
Poor/very poor gums	6.9	10.1	11.1	9.3
Dissatisfied by appearance of teeth	24.1	21.6	25.7	23.7
<i>Dentist would say that I</i>				
- should brush my teeth better	54.8	52.9	49.1	52.5
- need scaling of teeth	37.7	36.5	39.3	37.8
- need dental filling	20.9	20.1	25.0	21.9
- need tooth extraction	18.9	17.4	15.4	17.3
- straightening of teeth	40.3	38.8	38.4	39.2
- my teeth are not good	57.8	49.3	53.2	53.7
Other children make fun of my teeth	11.2	9.3	13.4	11.2
Had toothache during the past 12 months	36.6	40.7	47.7	41.3
Miss classes because of poor teeth	1.2	1.4	2.5	1.7

explore the interrelationships between perceived dental health, oral health-related attitudes and behavior, and general health and lifestyles. Finally, multiple logistic regression analysis was applied for study of the associations of perceived dental health, perceived need for dental care, and experience of dental symptoms with socio-behavioral variables. Odds ratios (ORs) were estimated for the discrete variables in the logistic regression model, and statistically evaluated by Wald statistics.

Results

Perceived dental health and attitudes

The findings on perceived dental health in relation to age are summarized in Table I. With regard to self-reported dental health, 14% of the students answered that their teeth were “very good”, 25% indicated “good”, 48% “average”, whereas 12% claimed “poor” or “very poor” teeth. Similar proportions were observed in relation to self-assessment of gums, i.e. 15% of the students reported their gums being “very good”, 25% “good”, 47% “average”, while 9% stated gums to be “poor” or “very poor”. In all, 11% of respondents said that other students made fun of their

teeth; 24% of the respondents were dissatisfied with the appearance of their teeth; and 41% claimed that they had experienced toothache or symptoms during the previous 12 months. As to the perceived need for dental care, 53% of the students answered that they needed instruction on how to perform better oral hygiene; need for orthodontic care was reported by 39%; 38% stated the need for scaling of their teeth; 22% felt the need of dental fillings, and 17% said that they needed tooth extraction.

Detailed analyses revealed that girls were more likely to report poor/very poor teeth and gums and being dissatisfied with the appearance of their teeth than boys. They also scored relatively high on experience of dental symptoms, whereas significantly more boys than girls declared the need for oral hygiene instructions and scaling of teeth ($p < 0.001$).

Oral health attitudes and knowledge

In general, positive attitudes and knowledge related to dental care were found in all age groups (Table II); however, about half of the students were not aware of the preventive effect of fluoride. As for knowledge about dental disease, 30% of the respondents answered that dental caries was caused by bacteria; the role of sugar was mentioned by 36% and bacteria plus sugar

Table II. The percentages of Chinese adolescents who had positive responses to statements on attitudes towards teeth and dental care

	11 years (n=948)	13 years (n=902)	15 years (n=812)	Total (n=2662)
Tooth decay can make me look bad	66.9	73.1	82.0	73.6
Keeping natural teeth is important	86.8	83.9	97.3	86.0
False teeth will be more of a bother than natural teeth	87.8	85.6	87.7	87.0
Not afraid of going to a dentist because of possible pain	87.1	81.9	79.8	83.1
Regular visits to the dentist keep away dental problems	77.1	74.1	78.3	76.4
Brushing my teeth can prevent tooth decay	79.3	75.1	78.9	77.8
Toothbrushing will prevent gum diseases	73.4	72.1	76.0	73.7
Eating or drinking sweet things causes caries	82.1	79.8	84.1	81.9
Using fluoride is a good way of preventing caries	51.2	52.0	61.2	54.5

Table III. The percentages of Chinese adolescents who reported certain oral health practices by age

	11 years (n=948)	13 years (n=902)	15 years (n=812)	Total (n=2662)
Toothbrushing once a day	25.6	31.5	33.4	30.0
Toothbrushing at least twice a day	71.1	66.1	64.2	67.3
Use of fluoridated toothpaste	42.9	44.6	57.6	48.0
Use of wooden toothpicks	46.3	44.9	43.1	44.9
Use of dental floss	15.5	12.3	9.4	12.5
Dentist visit within the past 12 months	29.3	23.1	23.6	25.5
Eating fresh fruits every day	74.4	70.8	66.1	70.7
Have soft drinks every day	11.4	19.8	17.9	16.2
Have biscuit/cakes every day	21.2	26.4	28.9	25.3
Tea with sugar every day	4.1	5.8	4.8	4.9

by 50%. Concerning the causes of bleeding gums, incorrect tooth-cleaning was reported by 68%, mixing hot and cold foods by 44%, unhealthy diet by 25%, general illness by 17%, and hereditary factors by 4%. Seventy-eight percent of the students answered that dental caries may be prevented by toothbrushing. In addition, nearly one-third of the students stressed rinsing of mouth with water and 17% suggested the use of drugs. Knowledge about the causes and prevention of dental disease showed weak associations with perceived dental health. However, students with high scores of knowledge on prevention of dental disease were less likely to claim poor/very poor teeth and gums than those with relatively low scores of knowledge on prevention of dental disease ($p < 0.05$).

Oral health behavior

Eating fresh fruits was frequent, whereas the figures for consumption of soft drinks, biscuit/cakes and tea with sugar were fairly low. Table III highlights the oral hygiene practices according to age in Chinese adolescents. Only a few students (3%) reported that they did not brush their teeth every day, about one-third

claimed brushing once a day, and two-thirds brushed their teeth at least twice a day; 48% of the students reported using fluoride toothpaste. In all, 45% of the students stated the use of wooden toothpicks, whereas dental floss was indicated by 13%. Visiting the dentist within the previous 12 months was claimed by one-fourth of the participants. Students who had visited the dentist within the previous 12 months and those who had infrequent oral hygiene practices relatively often reported poor/very poor teeth, poor/very poor gums and dissatisfaction with the appearance of their teeth compared to those who had not seen the dentist or had frequent oral hygiene practices (Tables IV and V). There was no significant association between consumption of sugary foods and drinks and perceived dental health. Students who had visited the dentist within the previous 12 months were more likely to report dental care needs and dental symptoms than those who had not visited a dentist. Furthermore, 46% of the students with a high consumption of sugary foods/drinks reported that they had suffered from toothache within the previous 12 months against 35% of those with low consumption of sugary foods/drinks ($p < 0.001$).

Table IV. The percentages of Chinese adolescents who reported certain dental health conditions according to number of visits to the dentist during the previous 12 months

	No visits (n=1984)	Once (n=359)	More than two times (n=319)	Total (n=2662)
Poor/very poor teeth	9.6	21.0***	15.5	11.9
Poor/very poor gums	7.6	17.3***	10.5	9.3
Dissatisfied by appearance of teeth	22.1	32.6**	23.8	23.7
<i>Dentist would say that I</i>				
- should brush my teeth better	51.3	53.5	58.4	52.5
- need scaling of teeth	37.8	34.7	41.3	37.8
- need dental filling	19.0	30.0***	29.2	21.9
- need tooth extraction	15.4	26.8***	17.9	17.3
- straightening of teeth	36.1	50.6***	44.9	39.2
- my teeth are not good	50.1	62.7	63.8***	53.7
Other children make fun of my teeth	16.7**	12.0	7.9	11.2
Had toothache during the past 12 months	45.5	40.4	39.1	41.3
Miss classes because of poor teeth	2.8	1.9	1.0	1.7

** $p < 0.01$; *** $p < 0.001$.

Table V. The percentages of Chinese adolescents who reported certain dental health conditions according to oral hygiene practices

	Oral hygiene practices			
	Low (n=1209)	Moderate (n=719)	High (n=734)	Total (n=2662)
Poor/very poor teeth	13.2***	11.3	10.3	11.9
Poor/very poor gums	10.8***	8.4	7.7	9.3
Dissatisfied by appearance of teeth	26.3***	23.4	19.9	23.7
<i>Dentist would say that I</i>				
- should brush my teeth better	53.7	51.8	51.4	52.5
- need scaling of teeth	37.8	38.3	37.3	37.8
- need dental filling	20.6	19.4	26.1*	21.9
- need tooth extraction	16.2	17.3	19.1	17.3
- straightening of teeth	38.7	42.8	36.7	39.2
- my teeth are not good	58.3**	52.0	48.0	53.7
Other children make fun of my teeth	10.3	11.1	12.8	11.2
Had toothache during the past 12 months	43.1	38.7	41.1	41.3
Miss classes because of poor teeth	1.7	1.1	2.0	1.7

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Socio-economic status and oral health

Table VI indicates the relationships between certain dental health conditions of adolescents and parents' level of education. The students with family backgrounds of low education were more likely to report poor/very poor teeth and gums and were more often dissatisfied with the appearance of their teeth than students with relatively high education level of parents ($p < 0.001$). A similar pattern was found in relation to the level of family income. Also, students with parents of low education tended relatively often having experienced toothache during the previous 12 months, and they often stated the need for scaling and tooth extraction ($p < 0.05$). Students of highly educated parents showed higher percentages of toothbrushing at least twice a day and the frequency of dental visits was

higher than among those with low education level of parents ($p < 0.001$).

School environment and oral health

Students who answered that they quite often performed badly in school often claimed poor teeth and gums, and of being dissatisfied with the appearance of their teeth (Table VII). These students were also more likely to indicate the need for oral hygiene instructions, scaling, dental filling, and tooth extraction than those who performed better in school. Furthermore, the scores on dental symptoms were higher among students performing poorly in school than among those performing better. On the other hand, students with better performance in school showed higher

Table VI. The percentages of Chinese adolescents who reported certain dental health conditions and oral health practices according to parents' education level

	Parents' education level			
	Low (n=983)	Moderate (n=782)	High (n=897)	Total (n=2662)
Poor/very poor teeth	13.9***	11.4	10.0	11.9
Poor/very poor gums	11.1***	9.4	7.2	9.3
Dissatisfied by appearance of teeth	26.7***	21.7	22.3	23.7
<i>Dentist would say that I</i>				
- should brush my teeth better	54.6	52.9	50.0	52.5
- need scaling of teeth	41.9*	36.1	35.1	37.8
- need dental filling	22.7	21.0	21.7	21.9
- need tooth extraction	20.0*	15.1	16.5	17.3
- straightening of teeth	38.2	38.7	40.8	39.2
- my teeth are not good	60.7***	50.8	48.9	53.7
Other children make fun of my teeth	11.4	11.9	10.5	11.2
Had toothache during the past 12 months	44.9*	40.6	38.0	41.3
Miss classes because of poor teeth	1.6	1.5	1.8	1.7
Toothbrushing at least twice a day	57.8	66.3	78.7***	67.3
Dental visit within the past 12 months	21.5	23.7	31.4***	25.5

* $p < 0.05$; *** $p < 0.001$.

Table VII. The percentages of Chinese adolescents who reported certain dental health conditions and oral health practices according to performance in school

	Performance in school			
	Low (n=791)	Moderate (n=952)	High (n=919)	Total (n=2662)
Poor/very poor teeth	14.8***	11.0	10.2	11.9
Poor/very poor gums	13.9***	7.7	7.0	9.3
Dissatisfied by appearance of teeth	28.7***	23.3	19.9	23.7
<i>Dentist would say that I</i>				
- should brush my teeth better	55.1*	54.1	48.9	52.5
- need scaling of teeth	43.1***	38.9	32.6	37.8
- need dental filling	22.9	24.0*	18.9	21.9
- need tooth extraction	21.6**	15.7	15.7	17.3
- straightening of teeth	41.5	39.1	37.7	39.2
- my teeth are not good	55.3	54.0	52.0	53.7
Other children make fun of my teeth	13.8*	11.0	9.2	11.2
Had toothache during the past 12 months	56.9***	41.5	36.4	41.3
Miss classes because of poor teeth	2.0	1.6	1.4	1.7
Toothbrushing at least twice a day	60.5	67.0	73.5***	67.3
Dental visit within the past 12 months	25.2	23.1	28.2*	25.5

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

percentages of toothbrushing at least twice a day and dental visits than those performing poorly in school.

General health behavior and lifestyles

As indicated in Table VIII, fairly high levels of general hygiene practices were reported for most respondents. The majority washed their hands before eating (70%) and after using the toilet (83%), and two-thirds (66%) used soap when washing their hands. In all, 6% of the students had tried smoking cigarettes at least once, but very few adolescents (4%) were currently smokers on a daily basis. Regular use of alcohol was low, but 41% of the students reported having tasted alcohol drinks. The use of tobacco and alcohol was more common among boys than among girls. Watching TV at least 4 h a day was observed for 10% of adolescents and playing computer games over 4 h a week was reported by 16%. The level of physical activity was higher among boys than among girls, as 34% of the boys reported that they exercised vigorously at least 4–6 h a week against 19% of the girls ($p < 0.001$). However, only weak associations between watching TV, playing computer games and physical activity and the dental health variables were noticed.

Oral health, general health, and lifestyles

The correlation analyses of oral health, general health, and lifestyle variables among Chinese adolescents showed weak associations. Perceived good dental health was negatively correlated with perceived need for dental care ($r = -0.39$, $p < 0.001$) and experience of dental symptoms ($r = -0.24$, $p < 0.001$). In addition, perceived high need for dental care was moderately correlated with experience of dental symptoms ($r = 0.22$, $p < 0.001$).

Multivariate analysis of perceived dental health

The relationships between perceived dental health status and socio-behavioral risk factors are given in Table IX. Only statistically significant associations are presented. Controlling for other factors, perceived dental health was related to eight socio-behavioral risks: gender, performance in school, general hygiene practices, visiting a dentist, alcohol habits, oral hygiene practices, parents' level of education, and consumption of healthy diet. The significant variables in the model on perceived need of dental care were gender, age, general hygiene practices, visiting a dentist, alcohol

Table VIII. The percentages of Chinese adolescents who reported certain general health practices by age

	11 years (n=948)	13 years (n=902)	15 years (n=812)	Total (n=2662)
Wash hands before eating	73.6	69.0	67.2	70.1
Wash hands after using the toilet	80.1	85.7	82.9	82.9
Use soap for washing hands	70.9	64.7	61.1	65.8
Currently smoking	1.6	2.2	4.6	3.7
Have ever tasted alcohol	40.2	36.8	47.3	41.2
Practice physical activity at least 4–6 h per week	23.6	27.1	29.9	26.7
Experience of general health symptoms	85.7	89.0	93.8	89.3

Table IX. Multivariate dummy regression analyses of the relationships between perceived dental health conditions and socio-behavioral risk factors in Chinese adolescents ($n=2662$)

Independent variable	Category	Perceived good dental health (OR)	Need of dental care (OR)	Dental symptoms (OR)
Gender	Boys	1.47**	0.79*	0.81*
	Girls	—	—	—
Age	11 years	0.93	1.34*	0.77*
	13 years	0.94	0.84	0.78*
	15 years	—	—	—
Parents' education level	Low	0.77*	1.64***	1.16
	Moderate	0.96	1.06	1.07
	High	—	—	—
Family income	Low	1.01	1.10	1.26
	Moderate	0.89	1.32**	1.14
	High	—	—	—
Lifestyle of parents	Low	1.24	0.94	0.80*
	Moderate	1.11	0.96	0.70
	High	—	—	—
Performance in school	Low	0.65**	1.05	1.24
	Moderate	0.86	1.06	1.17
	High	—	—	—
Attitudes about dental health	Low	0.86	1.67***	0.96
	Moderate	0.85	1.41**	1.05
	High	—	—	—
General hygiene practices	Low	0.72**	1.37*	1.71***
	Moderate	0.92	1.13	1.54***
	High	—	—	—
Oral hygiene practices	Low	0.76*	1.23*	0.90
	Moderate	0.92	1.13	0.84
	High	—	—	—
Visited physician during the past 12 months	No	1.12	1.01	0.39***
	Yes	—	—	—
Visited dentist during the past 12 months	No	1.59***	0.55***	0.56***
	Yes	—	—	—
Sugary foods/drinks	Low	1.26	1.20	0.71**
	Moderate	1.20	1.10	1.06
	High	—	—	—
Healthy dietary habits	Low	0.72**	1.10	1.18
	Moderate	0.82	1.00	1.19
	High	—	—	—
Alcohol habits	Low	1.44**	0.69**	0.77*
	Moderate	1.07	0.85	0.95
	High	—	—	—

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

habits, oral hygiene practices, family income, attitudes towards dental health and parents' education. Finally, the most important factors for experience of dental symptoms were gender, age, general hygiene practices, visiting a physician, visiting a dentist, alcohol habits, consumption of sugary foods and drinks, and lifestyle of parents.

Discussion

In industrialized countries, research has shown that oral health is an essential component of general health, and both health dimensions tend to have common risk factors [11–13]. The recent international study of “Youth People's Health in Context 2004” outlined how the health of children and adolescents is

influenced by individual lifestyles in addition to a wide range of social, cultural, and environmental factors [21]. Furthermore, the report emphasized that systematic information about health among adolescents is needed for countries in order to develop effective strategies towards improved health. Reducing risks to health would promote sustainable development of health and reduce social inequality in youth. Thus, the present study was carried out to describe the oral health behavior profile of Chinese adolescents residing in urban areas, to measure the general health behavior or lifestyles in adolescents, and to assess the links between socio-behavioral risk factors and perceived dental health.

The survey was not conducted on a national sample and the data are therefore not representative of the

country in pure statistical terms. However, the data are assumed to have relevance for most urban areas of China and the analytical power is considered fairly strong. One limitation of the study may relate to the selection of participants which was based on sampling of clusters rather than individuals. Respondents who make up such clusters may tend to have harmonized behavior or points of view. For example, within a classroom students are likely to share their views about the school and life events and this may also be the case with knowledge and attitudes towards dental care. In the present study, eight capital cities, including north, south, east, west, and central China, were selected to encompass the broad spectrum of urban adolescents. Available statistics on economic development show certain disparities among cities of the country as the economic growth rate in Beijing, Shanghai, and Guangdong is higher than for other cities. Concerning demographic profiles, no notable differences are found between the eight cities, except for the number of inhabitants.

The sociological data were collected by means of self-administered questionnaires and due to the school-based approach highly acceptable response rates were obtained. The questions concerning oral health behavior have been used successfully in previous studies by the authors [3,15,16], while questions on general health behavior were specified from health surveys conducted by WHO [10]. The validity and reliability of questions included in the present study were all pre-tested in earlier studies [3,10,15,16]. However, questionnaires used for collecting data on health behavior may have certain limitations. Individual perceptions of ideal oral self-care and lifestyles may lead to some overestimation of positive oral and general hygiene habits and attitudes towards dental care, whereas risk behavior, such as consumption of sugary foods and drinks, may probably be under-reported.

Young people often express low interest in health issues, but they are often very aware of their appearance [19]. For example, Östberg et al. found that 90% of adolescents claimed that their oral health was good, while 37% were dissatisfied with the appearance of their teeth [24]. In the present study, one-fourth of adolescents felt dissatisfied by the appearance of their teeth. Perceived dental health status of adolescents was measured by three indicators, i.e. self-assessment of dental health status, perceived need of dental care, and experience of dental symptoms. The vast majority of adolescents declared that their dental health was good, meanwhile 4 out of 10 respondents had experienced poor quality of life in terms of dental symptoms or toothache over the previous 12 months and nearly half of the respondents claimed that their teeth needed treatment. Negative scores on dental health were more common among older than younger respondents. As observed by Östberg et al. [24], girls were more likely to report poor/very poor teeth and gums, and they were

more often dissatisfied with the appearance of their teeth than boys. Girls also scored relatively higher than boys on experience of dental symptoms and the multivariate analysis confirmed that gender is one of the most important factors in perceived dental health of youth. However, the epidemiological data available in China have shown only minor differences in dental caries prevalence between boys and girls [14–16].

Studies of children and adolescents in industrialized countries [20,25] have demonstrated that socio-economic status of parents impacts on perceived dental health. The pattern is confirmed by this study in China, as students with family backgrounds of low education and income were more likely to report poor teeth and gums and dissatisfaction with the appearance of their teeth than those with relatively high education and income levels of parents. The years in school can be seen as a crucial period for development of self-esteem and health behavior. A European health survey of adolescents revealed that positive school experience is strongly associated with better self-rated general health and life satisfaction, few health complaints, and a low risk of smoking and alcohol use [21]. Moreover, school performance is consistently associated with oral health behavior, especially toothbrushing, consumption of soft drinks, and sweets [20,26,27], and the present study in China supports the European observations. The Chinese adolescents who performed well at school were relatively likely to have regular toothbrushing and dental visiting habits. In addition, better outcomes as measured by perceived dental health status were found in adolescents who like school, feel they are safe in school, do not feel boring by going to school or pressured by schoolwork, and having high academic expectation from parents. School performance was also significantly associated with perceived need of dental care and experience of dental symptoms. Thus, a positive school environment may provide for support for dental health, as well as encourage healthy lifestyles in oral health.

In accordance with other Chinese studies [2,16], almost all students brushed their teeth on a daily basis, and a positive association between regular oral hygiene habits and positive self-assessment of dental health status was observed. Meanwhile, the use of fluoridated toothpaste was fairly low, although the current rate was higher than figures reported in previous national surveys of oral health behavior in children and adolescents in China [2]. The low use of fluoridated toothpaste may be ascribed partly to the low awareness of the preventive effect of fluoride, and partly it may be due to the fact that a high proportion of toothpastes available on the market in China do not contain fluoride. One-fourth of the respondents reported dental visits during the previous 12 months, and this figure was much lower than reported in earlier Chinese studies [2,16]. In China, use of oral health services shows a different pattern than found in industrialised countries. Students who had visited the dentist within the

previous 12 months more often stated poor or very poor teeth, poor or very poor gums, and dissatisfaction with the appearance of their teeth than those who had not seen the dentist. In addition, the analysis revealed that if the students had frequent dental visits they were likely to report dental care needs and experience of dental symptoms. These findings are concordant with other Chinese studies showing that utilization of dental health services among Chinese adolescents is highly symptoms-oriented [2,16]. There is substantial evidence that sugary foods and drinks are risk factors for the development of dental caries [28]. In particular, the frequency of sugars consumed is considered to be harmful. Although there was no significant association between consumption of sugary foods and drinks and perceived dental health, adolescents with a high consumption of sugary food/drinks relatively often reported that they had suffered from toothache in the previous 12 months and dental care needs were also frequently reported. Meanwhile, compared to the European data [21], it is evident that the consumption of sugary foods and drinks among Chinese adolescents at present is low.

In the actual study, the prevalence rates of smoking and alcohol drinking were much lower than in Europe and the USA [9,10,21]. About one-fourth of the adolescents informed undertaking physical activity at a level that meets the current guidelines, i.e. one hour or more of moderate-to-vigorous intensity on five or more days per week, and this rate was lower than observed among adolescents in Europe [10,21]. Previous studies have highlighted the relationship between oral health behavior and general health behaviors. Tada & Matsukubo [17] reported that toothbrushing frequency was positively associated with five dimensions of general health behavior: smoking, alcohol use, exercise, eating breakfast, and having medical check-ups. Payne & Locker [11] demonstrated that additive indices on oral health and general health behavior were significantly correlated. The present study of young Chinese revealed weak bivariate associations between different health behaviors, but the multivariate analysis showed that among Chinese adolescents there were strong associations between the two general health variables and perceived dental health, perceived need for dental care, and experience of dental symptoms.

In conclusion, at the present time, self-assessment of dental health status is positive among most Chinese adolescents, reflecting the low level of dental caries as measured in clinical surveys. However, this study indicates that significant proportions of young Chinese have irregular or sporadic dental health practices. This is particularly the case with respect to the orientation of dental visiting habits and the low use of fluoridated toothpaste. Self-reported dental health was associated with gender, age, unhealthy lifestyles, and socio-economic status. Sound school performance was beneficial to perceived dental health, whereas unhealthy lifestyles, such as tobacco and alcohol use and

unhealthy dietary habits, may increase the risk of poor dental health. In light of the scarce resources and the current low level of oral disease in adolescents, health policy emphasizing prevention and health promotion would be more advantageous than traditional curative care. Oral health education in school would play a most instrumental role in improving the dental health of adolescents, and oral health should be integrated with other school health programs.

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