

Oral Health Knowledge, Perceptions, and Habits of Adolescents from Portugal, Romania, and Sweden: A Comparative Study

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ABSTRACT **Aims:** The study aimed to assess and compare the self-reported oral health knowledge, habits, and perceptions of adolescents in Portugal, Romania, and Sweden and the factors that may affect them. **Materials and Methods:** An oral health questionnaire with 25 questions was put together in English language and translated into Portuguese, Romanian, and Swedish language to investigate and compare oral health-related knowledge, habits, and perceptions of adolescents from the different countries. A voluntary sample of 879 teenagers completed it, mean aged 14.9 (± 1.83) years, from Romania ($n = 455$), Portugal ($n = 200$), and Sweden ($n = 224$) as part of the EuHyDens project. The survey took place between November 2015 and June 2016. **Results:** It showed some differences between the countries studied but more similarities between Portuguese and Romanian adolescents as related to perceptions of oral health and the use of oral services. Sweden and Portugal are more similar regarding oral health habits (toothbrushing and diet) as compared to Romanian adolescents. Portuguese adolescents have a higher oral health-related knowledge. **Conclusion:** Assessment of knowledge, perceptions, and habits of a population is essential for the adequate understanding of the oral health-care needs of the society. From the data collected, several differences were found. These differences can be used for tailor interventions to minimize inequalities between countries.

KEYWORDS: Adolescents, comparative study, habits, knowledge, oral health

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INTRODUCTION

Maintenance of adequate oral health depends on the adoption of specific behaviors, namely dental checkups,^[1] toothbrushing frequency,^[2] diet and sugar consumption,^[3] dental floss use, and other methods of interproximal cleaning.^[4]

These behaviors play an essential role in the prevention of dental caries and periodontal disease since adequate oral hygiene habits and regular use of dental services

have shown effectiveness in reducing the prevalence of these diseases^[5] as in the prevention and early diagnosis of oral diseases.^[6]

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Adolescents, like the general population, behave not only by their own choices and motivations, experience, lifestyle, beliefs, and value system^[7] but also are conditioned by sociocultural norms and by the oral health system that may differ between countries, with immediate or future impairment in oral health.^[8] Oral health attitudes acquired at this stage of existence are fundamental to maintaining good oral health habits throughout the life.^[7]

Oral diseases have psychological, physical, and social consequences on adolescents' lives. Oral health perception is linked to the valorization of this concept and plays an essential role in the concept of body image and quality of life.^[9] The fact that adolescents can consider oral health as a low priority in health care can affect the development of health behaviors and the ability to obtain knowledge that promotes good oral health.^[10]

There is evidence that supports the fact that proper oral health knowledge presents better oral care practices.^[11] Alongside this, a positive attitude toward oral health practices encourages better oral health habits.^[12] An improved understanding of what adolescents currently know about oral health can guide the development and implementation of oral health educational strategies to ensure that the additional knowledge translates into improved oral health.^[13]

Adolescence is a crucial period for implementing health promotion strategies.^[14] Studies in diversified geo-population contexts have identified multidimensional aspects related to adolescent health, suggesting that individual risk factors and social determinants may reveal essential associations for oral health in this age group.^[15]

The health system is one of the significant determinants of public oral health.^[16] In Europe, oral health-care systems are organized in different models depending on government involvement in treatment and oral health promotion policies. Also, the investment in oral health professionals dedicated to primary prevention varies between countries. These differences can lead to disparities in the population's oral health status, habits, and knowledge.^[17]

The Nordic oral health model is, for many years, characterized by an extensive public dental service assured by dentists and dental hygienists, with free services for the population aged less than 18 years and a substantial investment in preventive services and regular checkups.^[18]

The South European model is characterized predominantly by a private provision of oral health care with limited government involvement and a few

insurance schemes. The provision of free treatment and oral health promotion programs for people aged less than 18 years is assured, in recent years, by the government and performed by a limited number of dental hygienists.^[17]

The Eastern European model is now characterized, mainly, by private service, focusing on curative treatments instead of oral prevention and promotion strategies. The provision for treatment is made only by dentists, and it is free until the age of 19.^[17,19]

Recent studies showed that the involvement of dental hygienists in public health could raise public awareness and lead better oral health outcomes.^[20-22]

Obtaining data from a population of these different health systems could be essential to influence the development of oral health-care policies, to establish oral health promotion and prevention programs and to allocate medical-dental services appropriately. Thus, the objective of this study was to identify and compare oral health knowledge, habits, and perceptions of adolescents from the three different models.

MATERIALS AND METHODS

A minimum convenience sample of 200 adolescents, enough to work with an acceptable margin of error under 7.5%, for the country's population of adolescents, was intended in each partner: the Faculties of Dental Medicine at Lisbon University (ULisboa), Carol Davila University of Medicine and Pharmacy in Bucharest (CDUMPB), Victor Babes University of Medicine and Pharmacy in Timisoara (UMFT), and Karolinska Institutet in Stockholm (KI). A convenience sample (combined with a snowball sample) of adolescents, students from schools close to the project partners was obtained after consent from the school directors. Informed consent was obtained from parents and subjects to participate in the study. Once at the school, the selection of the class where to start collecting information was done, randomly, and from that moment on, the next classrooms were contacted and participants with signed consent forms completed the survey.

The survey was approved by the Ethics Committees (Portugal, March 8, 2016; Romania, 87/03.2016; Sweden DNR: 2016/270-31/1) of the aforementioned universities.

A transversal exploratory survey took place between November 2015 and June 2016 in Portugal, Romania, and Sweden, with the aim of providing evaluation data regarding oral health-related knowledge, habits, and perceptions among adolescents.

The survey was part of the Erasmus+ project, “European Training Platform for Continuing Professional Development of Dental Hygienists—EuHyDens.”

A questionnaire adapted from the World Health Organization (WHO)^[23] and from the study by Zhu *et al.*^[24] was developed for this purpose, within the project, by oral health specialists from ULisboa, CDUMPB, at UMFT, and at KI.

Twenty-five questions were included in the questionnaire with closed answer alternatives. The questions covered oral health issues concerning knowledge about oral health, oral hygiene and dietary habits, dental visiting patterns, and self-perceived oral health.

The questionnaire was translated by the country partner’s members, oral health specialists, fluent in English, into the Portuguese, Romanian, and Swedish, languages from an English version, and administered to all adolescents that accepted to participate in the survey. Face validity of the questionnaire was assessed to evaluate the overall acceptability regarding length, language clarity, and on the feasibility of adolescents completing and returning it and modified accordingly.

An “oral health knowledge score” was calculated by adding the total number of items answered correctly by the participants. Thus, oral health knowledge scores ranged from 0 to 6, with higher scores indicating better dental knowledge.

Descriptive data were collected for sample characterization and analysis of answers. Chi-squared test was used to examine the differences between the countries for the study variables and tests to compare column proportions adjusted by the Bonferroni correction for all pairwise country comparisons. One-way analysis of variance (ANOVA) was used to test differences between countries on oral health knowledge score, and the Pearson coefficient was used to evaluate the correlation between oral health knowledge score

with perceptions and habits variables. The level of significance was set at ≤ 0.05 . All statistical analysis was calculated with the Statistical Package for the Social Sciences program, version 25.0, for Windows (IBM, Armonk, New York).

RESULTS

A total of 879 adolescents from Sweden (224; 25.5%), Romania (455; 51.8%), and Portugal (200; 22.8%) completed the questionnaire. The distribution of the study sample according to age and gender is shown in Table 1.

The mean age of adolescents was 14.87 (± 1.83) years with Romanian adolescents aged 12–13 years as compared to Swedish and Portuguese adolescents ($P < 0.001$). There was a slight predomination of the male gender (486; 55.3%). Most of the participants were from urban areas (576; 65.5%), and the vast majority of the participants were native from the countries studied (825; 93.8%).

More than half of the participants (453; 53.6%) reported having received information regarding oral health from the dentist. The dental hygienist as the source of information was reported by less than 10% (73). The most common type of advice from the dental professional was toothbrushing (587; 68%) followed by caries prevention. Advice on gum disease prevention and dental floss use was reported by around a quarter of participants (27.4% and 25.7%, respectively). Nevertheless, 12.3% (106) reported not having received any advice. Least advice on flossing was observed in Romanian adolescents ($P < 0.001$) and most advice concerning dental caries and gum inflammation was given in Portuguese adolescents ($P < 0.001$) in Portuguese adolescents concerning dental caries and gum inflammation ($P < 0.001$).

A vast majority of adolescents (709; 81.2%) had good knowledge about the cleaning effect of toothbrushing, even though only 59% (515) agreed with the fact that brushing teeth can prevent tooth decay. In total,

Table 1: Description of the sample according to sociodemographic characteristics by country

Sociodemographic characteristics	Country				P value*
	Portugal (A) n (%)	Romania (B) n (%)	Sweden (C) n (%)	Total n (%)	
Sex					
Female	101 (50.5)	194 (42.6)	98 (43.8)	393 (44.7)	0.166
Male	99 (49.5)	261 (57.4)	126 (56.2)	486 (55.3)	
Age groups (years)					
12–13	13 (6.5)	213 ^{A,C} (46.8)	14 (6.3)	240 (27.3)	0.001
14–15	86 ^B (43.0)	122 (26.8)	91 ^B (40.6)	299 (34.0)	
16–17	88 ^B (44.0)	66 (14.5)	98 ^B (43.8)	252 (28.7)	
18	13 (6.5)	54 (11.9)	21 (9.4)	88 (10.0)	

*Chi-squared test. Tests are adjusted for all pairwise comparisons within a row of each innermost subtable using the Bonferroni correction: $P < 0.05$ for upper case letters (A, B, C)

74.9% (660) of the adolescents were not aware of the fact that toothbrushing can prevent periodontal diseases; however, almost three-quarters knew that blood on toothbrush indicated gum disease (611; 71.1%). Many participants were aware of the risks of consuming foods and drinks containing sugar and their detrimental effect on oral health; 86.5% (760) identified

sweet drinks harmful for teeth, yet only 55.9% (479) identified energy drinks. Nearly one-quarter of the participants (235; 27.3%) did not know what fluoride is, with only 40.5% (348) pointing protection from caries as a fluoride benefit.

In general, it seems that Portuguese adolescents have more knowledge concerning toothbrushing benefits

Table 2: Oral health related knowledge

Oral health related knowledge	Country of residence				P value*
	Portugal (A)	Romania (B)	Sweden (C)	Total	
	n (%)	n (%)	n (%)	n (%)	
Main source of health information					
Media	32 (16.2)	108 ^C (23.9)	28 (14.3)	168 (19.9)	0.001
Dentist	99 (50.3)	236 (52.2)	118 (60.2)	453 (53.6)	
Dental hygienist	19 (9.6)	29 (6.4)	25 ^B (12.8)	73 (8.6)	
Relatives/friends	38 ^{B,C} (19.3)	48 (10.6)	14 (7.1)	100 (11.8)	
School	9 (4.6)	31 (6.9)	11 (5.6)	51 (6.0)	
Reason for toothbrushing					
Prevention of cavities	171 ^{B,C} (86.4)	197 (43.3)	147 ^B (66.8)	515 (59.0)	0.001
Prevention of bleeding gums	77 ^{B,C} (38.9)	86 (18.9)	56 (25.5)	219 (25.1)	0.001
Clean teeth	186 ^{B,C} (93.9)	363 (79.8)	160 (72.7)	709 (81.2)	0.001
Bright teeth	91 (46.0)	170 (37.4)	124 ^B (56.4)	385 (44.1)	0.001
Get rid of bad breath	154 ^{B,C} (77.8)	192 (42.2)	122 (55.5)	468 (53.6)	0.001
I was told to	15 (7.6)	27 (5.9)	24 (10.9)	66 (7.6)	0.072
Set good example	30 (15.2)	56 (12.3)	0 ^{A,B} (0.0)	86 (9.8)	0.001
Fluoride benefit					
Whitens teeth	18 (9.1)	196 ^{A,C} (43.7)	12 (5.6)	226 (26.3)	0.001
Protect from caries	126 ^B (63.6)	110 (24.5)	112 (52.6)	348 (40.5)	
Protection from gum disease	12 (6.1)	27 (6.0)	12 (5.6)	51 (5.9)	
Do not know	42 (21.2)	116 (25.8)	77 ^{A,B} (36.2)	235 (27.3)	
Cause of tooth decay					
Meat	4 (2.0)	48 ^A (10.5)	22 ^A (10.7)	74 (8.6)	0.001
Sugary foods	198 ^{B,C} (99.0)	383 (84.2)	161 (78.5)	742 (86.3)	
Fatty foods	42 ^B (21.0)	44 (9.7)	32 (15.6)	118 (13.7)	
Fruits and vegetables	4 (2.0)	18 (4.0)	30 ^{A,B} (14.6)	52 (6.0)	
Harmful drinks to teeth					
Soft drinks, sweet milk, canned juice	197 ^{A,B} (98.5)	413 ^A (90.8)	150 (67.0)	760 (86.5)	0.001
Fresh milk	2 (1.0)	14 (3.1)	26 ^{B,C} (12.7)	42 (4.9)	0.001
Fresh juices	4 (2.0)	13 (2.9)	56 ^{B,C} (27.5)	73 (8.5)	0.001
Energy drinks	118 (59.9)	251 (55.2)	110 (53.7)	479 (55.9)	0.408
Blood on toothbrush indicates					
Gum disease	157 ^{A,B} (79.7)	313 (69.6)	141 (66.5)	611 (71.1)	0.001
Tooth decay	7 (3.6)	54 ^{A,C} (12.0)	6 (2.8)	67 (7.8)	
Do not know	33 (16.8)	83 (18.4)	65 ^{A,B} (30.7)	181 (21.1)	
Importance of oral health					
Chewing	73 (37.6)	129 (28.7)	91 ^B (43.8)	293 (34.4)	0.001
Speech	15 (7.7)	87 ^{A,C} (19.3)	23 (11.1)	125 (14.7)	
Appearance	61 (31.4)	132 (29.3)	59 (28.4)	252 (29.6)	
Self-confidence	45 (23.2)	102 (22.7)	35 (16.8)	182 (21.4)	
Oral health importance for general health					
No	3 (1.5)	9 (2.0)	6 (2.7)	18 (2.1)	0.001
Yes	187 ^{B,C} (94.4)	396 ^C (87.4)	177 (79.4)	760 (87.0)	
Do not know	8 (4.0)	48 ^A (10.6)	40 ^{A,B} (17.9)	96 (11.0)	

*Chi-squared test. Tests are adjusted for all pairwise comparisons within a row of each innermost subtable using the Bonferroni correction: $P < 0.05$ for upper case letters (A, B, C)

and related them to the prevention of oral diseases ($P < 0.001$). The same happens to fluoride benefits ($P < 0.001$), identifying sugary foods as dental caries promoters ($P < 0.001$), and harmful effects of sweet drinks on teeth ($P < 0.001$) [Table 2].

Overall, the knowledge mean of the adolescents was 3.61 (± 1.37). Portuguese adolescents reveal the best knowledge as compared to Swedish and Romanian counterparts. No differences were found between Swedish and Romanian knowledge mean [Table 3].

The majority of adolescents perceived the state of their teeth (759; 86.5%) and gums (751; 86.6%) as good or very good in the three countries; however, the state of teeth perception within Romanian participants

was more favorable than in Swedish and Portuguese ($P < 0.001$). The Swedish adolescents perceived the state of gum health worse than their Portuguese and Romanian counterparts ($P < 0.001$). Chewing was pointed as the most important reason to have a good habit of oral health among Swedish (91; 43.8%) and Portuguese (73; 37.6%) participants, whereas in Romanian (132; 29.3%), appearance was the most frequent answer. Romanian adolescents rated speech as more important in oral health than their peers in Sweden and Portugal ($P < 0.001$). The item appearance and self-confidence comprised 51% (434) answers in the total sample. When asked about pain and discomfort in the previous 12 months, 595 (67.9%) reported having had some experience. The Romanian participants

Table 3: Intergroup comparisons of oral hygiene knowledge and pairwise significance between countries using *post hoc* LSD test

Country of residence (I)	Oral health knowledge score (\pm SD)	P value ^a	Country of residence (J)	Mean difference (I-J)	P value ^b	95% CI lower bound	95% CI upper bound
Sweden	3.4292 (± 1.58)	0.001	Romania	0.05342	0.625	-0.161	0.2679
			Portugal	-0.915	0.001	-1.17	-0.6615
Romania	3.3758 (± 1.27)		Sweden	-0.05342	0.625	-0.2679	0.161
			Portugal	-0.969	0.001	-1.188	-0.7504
Portugal	4.34 (± 1.07)		Sweden	0.915*	0.001	0.6615	1.17
			Romania	0.969*	0.001	0.7504	1.188

SD = standard deviation, CI = confidence intervals

^aOne-way ANOVA, ^bMultiple comparisons LSD

Table 4: Perceptions of oral health by country

Perceptions of oral health	Country of residence			Total	P value*
	Portugal (A)	Romania (B)	Sweden (C)		
	n (%)	n (%)	n (%)	n (%)	
State of teeth					
Positive	169 (84.5)	415 ^{AC} (91.2)	175 (78.8)	759 (86.5)	0.001
Average	30 ^B (15.0)	26 (5.7)	41 ^B (18.5)	97 (11.1)	
Negative	1 (0.5)	14 (3.1)	6 (2.7)	21 (2.4)	
State of gums					
Positive	173 (87.8)	414 ^C (91.2)	164 (75.9)	751 (86.6)	0.001
Average	24 (12.2)	33 (7.3)	40 ^B (18.5)	97 (11.2)	
Negative	0 (0.0)	7 (1.5)	12 ^B (5.6)	19 (2.2)	
Pain/discomfort 12 months					
Often	3 (1.5)	27 ^A (5.9)	7 (3.1)	37 (4.2)	0.001
Occasionally	26 (13.1)	40 (8.8)	35 ^B (15.7)	101 (11.5)	
Rarely	84 (42.4)	271 ^{A,C} (56.9)	102 (45.7)	457 (52.2)	
Never	77 ^B (38.9)	98 (21.5)	69 ^B (30.9)	244 (27.9)	
Do not know	8 (4.0)	19 (4.2)	10 (4.5)	37 (4.2)	
Past problems cavities	30 (15.5)	182 ^{A,C} (40.0)	23 (10.3)	235 (26.9)	0.001
Past problems bleeding gums	44 (22.7)	116 (25.5)	62 (27.7)	222 (25.4)	0.504
Past problems discoloration	18 (9.3)	28 (6.2)	39 ^{B,C} (17.4)	85 (9.7)	0.001
Past problems ortho	54 (27.8)	70 ^A (15.4)	41 (18.3)	165 (18.9)	0.001
Past problems bad breath	13 (6.7)	31 (6.8)	27 (12.1)	71 (8.1)	0.045
No past problems	64 (33.0)	101 (22.2)	63 (28.1)	228 (26.1)	0.012

* Chi-squared test. Tests are adjusted for all pairwise comparisons within a row of each innermost subtable using the Bonferroni correction: $P < 0.05$ for upper case letters (A, B, C)

reported the higher percentage of never having pain ($P < 0.001$). Differences were found regarding the type of past problems between countries: the Romanians had more cavities problems ($P < 0.001$), Swedish had more discoloration of teeth ($P < 0.001$), and Portuguese had more orthodontic problems ($P < 0.001$). No differences between countries were found for bleeding gums and bad breath problems [Table 4].

Regarding the consumption of sweet foods, 41% (355) consumed one time or more a day, 478 (57.1%) consumed once or more a week but not daily, and 3.9% (34) reported never consuming sweet foods. Romanian participants reported higher frequency consumption of sugary foods as compared to Swedish and Portuguese participants ($P < 0.001$). The intake of sugary drinks was frequent. Only 78 (9.1%) reported never to consume sugary drinks, 55.4% (475) consumed sugary drinks till six times a week, and 35.5% (304) reported to consume sugar-containing drinks daily. Again, the consumption was higher in Romanian ($P < 0.001$). Six hundred and seventy-one (77.4%) adolescents reported brushing their teeth two or more times a day, with Romanians doing so less frequently ($P < 0.001$). There are 1 in 10 Romanians (10.3%) who never or seldom brush their teeth. Portuguese participants change their toothbrush less often than their counterparts ($P < 0.001$). Although fluoride toothpaste is widely used by almost all participants (814; 93.2%), some difference can be seen in Romania not using as much as the other countries (37; 8.1%). Whitening and desensitizing toothpaste seem to be more popular among adolescents in Portugal and Romania ($P < 0.001$). There is a lack of knowledge about toothpaste type used among all participants although less evident in Romania ($P < 0.001$).

More than half of the participants (469; 54%) never used dental floss, this habit being less frequent in Romania ($P < 0.001$). The daily frequency reported was 14.4% (125). The presence of material between teeth motivated more adolescents in Sweden (68; 31.1%) and Portugal (60; 30.2%) to use dental floss.

The smoking habit was reported daily or occasionally in 102 (11.7%) adolescents. This habit seemed to be more frequent among Romanians, although no significant difference was found. In total, 16 (7.1%) adolescents reported snuff use from Sweden [Table 5].

Table 6 shows the dental visiting pattern by country. More than half of the participants (514; 58.9%) visited an oral health professional in the last 12 months with Romanian participants doing so significantly less. One-fifth (97; 21.4%) of the Romanians reported having the

last visit three or more years ago or never being to an oral health professional ($P < 0.001$).

Preventive reasons for visiting were reported more by Swedish participants ($P < 0.001$), whereas extraction was most frequent in Romanian participants ($P < 0.001$). In Sweden, restorative care was less frequent than in Romania and Portugal ($P < 0.001$). In Romania and Portugal, the majority of participants reported having been treated in private clinics or hospitals, whereas in Sweden, this was done in public institutions.

Table 7 summarizes the relationship between oral health knowledge score with perceptions and habits. Higher knowledge was correlated with toothbrushing two or more times a day ($P < 0.01$) and having visited a dental professional in the last year ($P < 0.01$). The poor perceived state of teeth was negatively correlated, not statistically significant, with a higher knowledge score as well as having pain in the last 12 months. According to the coefficients shown in the table, greater knowledge was associated with better habits and also with a more positive perception toward oral health.

DISCUSSION

Knowledge, habits, and self-perceptions of oral health were studied by several authors worldwide indicating that multiple factors affect them. Among these factors is the health system. Therefore, this study aimed to assess if, among three different health systems, the Nordic, the South European, and the Eastern European models, there were differences between oral health knowledge, habits, and perceptions in a sample of adolescents. This survey can potentially identify knowledge gaps and identify whether the health system influences the practice of specific health behaviors and attitudes—sources that are important to define effective methods for oral disease prevention and to orient resource allocation and project design.

Health systems have significant potential to change health behaviors and to improve health^[25] and that preventive orientation can also reduce the demand for health services and the economic burden of oral diseases.^[26]

In the health system models studied, treatment of oral diseases is generally available for persons under 18 years of age, differences in prevention and promotion efforts, aiming at the adoption of healthier lifestyles are observed. Hence, in Sweden, for several years now, a significant amount of emphasis has been made on the prevention of disease rather than the treatment aspect.^[18] In contrast, in Romania^[19] oral health-care services are mostly treatment oriented, whereas

limited resources and attention have been dedicated to preventive services. In Portugal, preventive oral health care was started around 30 years ago supported by the government, delivered mainly in public schools, but still not having a universal coverage.^[17]

Oral health knowledge is considered to be an essential prerequisite for health-related behavior^[12] and a significant predictor of intention to improve oral

health behaviors.^[27] Although knowledge alone does not necessarily lead to desirable health behaviors,^[28] knowledge gained may serve as a tool to empower population groups with accurate information about health, enabling them to take action to protect their health.^[26]

Participants reported, in all countries, the dentist as the main source of health information, with relatives/

Table 5: Dietary and oral hygiene habits by country

Dietary and oral hygiene habits	Country of residence				P value*
	Portugal (A)	Romania (B)	Sweden (C)	Total	
	n (%)	n (%)	n (%)	n (%)	
Frequency of sugary foods					
4×/day or more	9 (4.6)	103 ^{A,C} (22.8)	12 (5.5)	124 (14.3)	0.001
1–3×/day	35 (17.8)	163 ^{A,C} (36.1)	33 (15.1)	231 (26.6)	
4×/week or more	42 (21.3)	99 (22.0)	44 (20.1)	185 (21.3)	
1–3×/week	102 ^B (51.8)	77 (17.1)	114 ^B (52.1)	293 (33.8)	
Never	9 (4.6)	9 (2.0)	16 (7.3)	34 (3.9)	
Frequency of sugary drinks					
4×/day or more	16 (8.2)	91 ^{A,C} (20.4)	13 (6.0)	120 (14.0)	0.001
1–3×/day	33 (16.9)	116 ^{A,C} (26.0)	35 (16.2)	184 (21.5)	
4×/week or more	42 (21.5)	102 (22.9)	32 (14.8)	176 (20.5)	
1–3×/week	83 ^B (42.6)	101 (22.6)	115 ^B (53.2)	299 (34.9)	
Never	21 (10.8)	36 (8.1)	21 (9.7)	78 (9.1)	
Frequency of toothbrushing					
Never/seldom	0 (0.0)	47 ^C (10.3)	3 (1.4)	50 (5.8)	0.001
Once a day	24 (12.1)	102 ^{A,C} (22.4)	20 (9.4)	146 (16.8)	
Two or more times a day	175 ^B (87.9)	306 (67.3)	190 ^B (89.2)	671 (77.4)	
Change toothbrush					
1–3 months	55 (27.6)	289 ^{A,C} (63.5)	99 ^A (45.2)	443 (50.7)	0.001
4–6 months	81 ^{B,C} (40.7)	87 (19.1)	58 (26.5)	226 (25.9)	
7–12 months	24 (12.1)	31 (6.8)	25 (11.4)	80 (9.2)	
More than 1 year	9 (4.5)	20 (4.4)	5 (2.3)	34 (3.9)	
Do not know	30 ^B (15.1)	28 (6.2)	32 ^B (14.6)	90 (10.3)	
Toothpaste ^a					
Fluoride	195 ^B (96.0)	418 (91.9)	213 ^B (97.3)	814 (93.2)	0.001
Whitening	102 ^C (51.3)	227 ^C (49.9)	48 (21.9)	377 (43.2)	0.001
Desensitizing	15 ^C (7.5)	54 ^C (11.9)	3 (1.4)	72 (8.2)	0.001
Gingival care	12 (6.0)	34 ^C (7.5)	5 (2.3)	51 (5.8)	0.027
Do not know	49 ^B (24.6)	72 (15.8)	71 ^B (32.4)	192 (22.0)	0.001
Dental floss					
Never	92 (46.2)	276 ^{A,C} (61.2)	101 (46.1)	469 (54.0)	0.001
Once a day	33 (16.6)	67 (14.9)	25 (11.4)	125 (14.4)	
Once a week	6 (3.0)	29 (6.4)	16 (7.3)	51 (5.9)	
When I feel something in my teeth	60 ^B (30.2)	55 (12.2)	68 ^B (31.1)	183 (21.1)	
When I go out	1 (0.5)	8 (1.8)	5 (2.3)	14 (1.6)	
When I am told to	7 (3.5)	16 (3.5)	4 (1.8)	27 (3.1)	
Smoking					
Yes	8 (4.1)	37 (8.1)	17 (7.6)	62 (7.1)	0.218
Sometimes	11 (5.6)	16 (3.5)	13 (5.8)	40 (4.6)	
Never	177 (90.3)	402 (88.4)	194 (86.6)	773 (88.3)	

*Chi-squared test. Tests are adjusted for all pairwise comparisons within a row of each innermost subtable using the Bonferroni correction: $P < 0.05$ for upper case letters (A, B, C)

^aTotal numbers add up to more than the total number of subjects due to reporting of multiple types of toothpaste by some subjects

Table 6: Use of oral services/dental visiting patterns by country

Visiting patterns	Country of residence				P value*
	Portugal (A)	Romania (B)	Sweden (C)	Total	
	n (%)	n (%)	n (%)	n (%)	
Last visit to dental professional					
<12 months	140 ^B (70.7)	212 (46.8)	162 ^B (73.0)	514 (58.9)	0.001
1–2 years	27 (13.6)	93 (20.5)	36 (16.2)	156 (17.9)	
Three or more	11 (5.6)	57 ^{A,C} (12.6)	8 (3.6)	76 (8.7)	
Never	4 (2.0)	40 ^{A,C} (8.8)	59 (2.3)	49 (5.6)	
Do not know/remember	16 (8.1)	51 ^A (11.3)	11 (5.0)	78 (8.9)	
Reasons for last visit					
Preventive	106 ^B (56.1)	127 (27.9)	157 ^{A,B} (72.4)	390 (45.3)	0.001
Periodontal	16 ^B (8.5)	31 (6.8)	6 (2.7)	53 (8.2)	0.001
Restorative care	46 ^A (24.3)	137 ^A (30.1)	18 (8.3)	201 (23.3)	0.001
Orthodontic	32 ^B (16.9)	46 (10.1)	31 (14.3)	109 (12.7)	0.043
Cosmetic	15 ^B (7.9)	18 (4.0)	0 (0.0)	33 (3.8)	0.001
Wisdom tooth removal	5 (2.6)	31 ^C (6.8)	0 (0.0)	36 (4.2)	0.001
Extraction	4 (2.1)	72 ^{A,C} (15.8)	7 (3.2)	83 (9.6)	0.001
Trauma	1 (0.5)	13 (2.9)	4 (1.8)	18 (2.1)	0.163
Never been	15 (7.9)	70 ^{A,C} (15.4)	7 (3.2)	92 (10.7)	0.001
Place where visits took place					
Private clinic/hospital	166 ^C (83.0)	360 ^C (79.1)	28 (13.1)	554 (63.8)	0.001
Public institution	24 (12.0)	6 (13.8)	181 ^{A,B} (85.0)	268 (30.9)	
University clinic	0 (0.0)	14 (3.1)	4 (1.9)	18 (2.1)	

*Chi-squared test. Tests are adjusted for all pairwise comparisons within a row of each innermost subtable using the Bonferroni correction: $P < 0.05$ for upper case letters (A, B, C)

Table 7: Correlation between oral health score and oral health habits and perceptions

Oral health habits and perceptions	Oral health score knowledge			All
	Portugal	Romania	Sweden	
Last visit 12 months	0.123	0.157**	0.146*	0.177**
Toothbrushing $\geq 2 \times$ /day	0.048	0.052	0.182**	0.120**
Dental floss $\geq 1 \times$ day	-0.086	0.000	0.134	0.026
Perceived state of teeth	-0.11	-0.027	-0.004	-0.005
Perceived state of gums		0.065	-0.015	0.04
Pain in the last 12 months	0.036	-0.029	-0.003	-0.027

Pearson correlation; *Correlation is significant at the 0.05 level, **Correlation is significant at the 0.01 level

friends and schools being the least reported. This highlights the need to strengthen the Health Promoting Schools Framework^[29] and the role of teachers in health education.^[30]

The results found in this study showed that the main reason for toothbrushing is to clean teeth. Other high-frequency answers were “get rid of bad breath” and “bright teeth.” This highlights the importance given by adolescents to cosmetic reasons rather than preventive health reasons seen in other studies.^[31-34] Toothbrushing for preventing bleeding gums was reported by only one-fourth of participants, yet blood on toothbrush was recognized as a sign of gum disease by the majority of respondents. This agrees with studies where the participants showed higher awareness of caries than periodontal conditions^[10,35] and that were unaware of the role of toothbrushing in the prevention of bleeding gums.^[36]

Less than half of the participants correctly identified the action of fluoride as preventing tooth decay, with approximately one-fourth not knowing the reason why to use fluoride. This same trend was seen in other studies conducted in adolescents,^[13,37,38] suggesting the need to increase the awareness of the benefits of fluoride. Romanian youngsters reported more cosmetic reasons for using fluoride. This reinforces the media influence as well as the need for adolescents to have a good appearance.^[28,34,39]

The respondent’s knowledge about sugary foods as a cariogenic diet and harmful drinks to teeth were quite adequate. However, only approximately half of them recognized energy drinks as harmful to teeth, requiring appropriate guidance in this area. This is of particular importance as adolescence is a time of heightened caries activity due to an increased intake of cariogenic

substances^[40] and because the external environment had an increasing impact on behavior.^[41]

The importance of oral health for general health was acknowledged by the vast majority of participants. Nevertheless, Swedish adolescents reported less knowledge on oral health been vital for general health when compared to Portuguese and Romanian adolescents. Adolescents recognized the importance of oral health to physical tasks, such as chewing but also for appearance and self-confidence. The fact that oral health is an essential aspect of their ability to relate to the world on social levels was pointed out in other studies.^[42]

Previous studies have shown an association between increased knowledge and better oral health practices and outcomes.^[43] In this study, those that brush their teeth two times or more a day and had the last dental visit in the previous 12 months showed better knowledge.

Oral health-related knowledge needs to be improved in all the countries studied, but especially in Romania. This could be due to lack of an organized and systematic oral health education program in the country.^[44] Besides, adolescent's desire for a fresh-feeling mouth and to fit in socially must be affirmed and utilized in health promotion strategies. This aspect along with critical determinants of healthy habits should be routinely taken into consideration in order to tailor education and counseling to the unique needs of a particular community.^[45]

Almost all participants in the study rated their state of teeth and gums positively or average, similar to reports from earlier studies.^[33,46,47] The pain was significantly associated with poor ratings of state of teeth, as observed by some other authors.^[48]

Significant differences roused between countries. Romanians were more likely to report the experience of pain as well as past problems with cavities. On the contrary, Swedish reported significantly more discoloration problems, whereas Portuguese reported more orthodontic problems.

Self-assessed oral health is a reasonably good estimate for the absence of clinically determined dental and periodontal treatment need.^[49] As to implication for practice, self-assessed data could be used for screening purposes for oral health service planning and priority allocation in large populations.^[48]

Results showed that more than half of the participants visited an oral health professional in the last 12 months with Romanian participants doing so significantly less. One-fifth of the Romanians reported having the last visit three or more years ago or never being to oral

health professional. These results are similar to the ones presented in Eurobarometer 330,^[50] where 59% of young Europeans last visited their dentist less than one year ago. Also, this report refers that the majority of respondents who have visited a dentist during the past 12 months were inhabitants of northern European Union countries such as Sweden. On the other hand, Romania was in the group of countries, in the east of the European Union, least likely to have visited a dentist during the past year.

Preventive reasons for visiting were significantly more reported by Swedish participants, whereas extraction was most frequent in Romanian participants. In Sweden, restorative care was less frequent than in Romania and Portugal. Again, these results agree with the ones reported by the European survey reported in Eurobarometer 330,^[50] where, during the last visit to a dentist, the inhabitants of Sweden were the most likely to have gone for a checkup, the Portuguese for routine treatments, and the inhabitants from Romania went to a dentist for emergency treatment.

In Romania and Portugal, the majority of participants reported having been treated in private clinics or hospitals, whereas in Sweden this was done in public institutions. The differences in the results could reflect specific national policies and different oral health systems. It should also be remembered that in some countries of northern European Union, it is compulsory for inhabitants to go to their dentist once a year or even every six months in order to continue to benefit from medical insurance cover for their teeth.^[50] Also, a factor that impacts on dental attendance is the structure for the delivery of oral health-care services, which varies significantly between individual Member States.^[51]

According to Kino *et al.*,^[52] there was an inverse association between better quality of health-care system, and higher public expenditure on health care and education systems and co-occurrence of health-risk behaviors, including nonroutine dental attendance. As in the study of Kino *et al.*,^[6] the findings from this study support the idea that a good health-care system would possibly promote the use of dental checkups. In fact, in Sweden, where the percentage of health expenditure of gross domestic product is the highest of the three countries studied,^[53] there was a significantly higher level of attendance in the previous 12 months, and these visits were mainly for preventive reasons, as compared to Portugal and Romania.

The data collected in this study are similar and follow the trend, among the countries surveyed, of the results reported by WHO in Health Behaviour in School-aged Children (HBSC) survey 2013/2014.^[54]

The results of this study show that Romanian adolescents brush their teeth less frequently than Portuguese and Swedish. Also, more than half of the samples never use dental floss, this habit being less frequent in Romania.

Although the prevalence of brushing at least twice a day is high in these countries, they still have room for improvement. The geographical differences in oral habits remain a challenge for oral health promotion.

Community public oral health programs could increase awareness and enhance adolescent education to encourage healthy routines and self-care.

The intake of soft drinks and sweet foods was frequent, and significantly higher in Romania compared to Sweden and Portugal.

The cultural habits of Europeans play an essential role in their dietary habits, even when small quantities are involved.

The data from this study are restricted to a convenience sample. Consequently, other studies may present different data than those found here due to the characteristics and size of the analyzed sample, geographic distribution, environmental and social factors, among others.

Despite the adoption of all the criteria and methodological care, some questionnaires were not completely filled out, constituting, therefore, another limitation of this research.

This study was based on self-reported data. Thus, the participants may tend to give socially desirable responses by overestimating positive behaviors and underestimating negative ones. Nevertheless, it is the most common way of gathering answers of this kind, and it is a recognized survey tool in epidemiology.

Within the limits of this study, the information gained from it may be useful in the future for planning preventive programs and health-promoting strategies.

As a conclusion, assessment of knowledge, perceptions, and habits of a population is essential for the adequate understanding of the oral health-care needs of the society. From the data collected, several differences were found. These differences can be used for tailor interventions to minimize inequalities between countries. Depending on the social and political system of each country, the health policy, oral health services, and their funding need to support the preventive oral health of adolescents in order to support lifelong health-promoting behaviors.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

REFERENCES

1. Astrom AN, Ekback G, Ordell S, Gulcan F. Changes in oral health-related quality of life (OHRQoL) related to long-term utilization of dental care among older people. *Acta Odontol Scand* 2018;76:559-66.
2. Laajala A, Pesonen P, Anttonen V, Laitala ML. Association of enamel caries lesions with oral hygiene and DMFT among adults. *Caries Res* 2019;53:475-481.
3. Moynihan P, Makino Y, Petersen PE, Ogawa H. Implications of WHO guideline on sugars for dental health professionals. *Commun Dent Oral Epidemiol* 2018;46:1-7.
4. Worthington HV, MacDonald L, Poklepovic Pericic T, Sambunjak D, Johnson TM, Imai P, *et al.* Home use of interdental cleaning devices, in addition to toothbrushing, for preventing and controlling periodontal diseases and dental caries. *Cochrane Database of Syst Rev* 2019;4:Cd012018.
5. Jepsen S, Blanco J, Buchalla W, Carvalho JC, Dietrich T, Dorfer C, *et al.* Prevention and control of dental caries and periodontal diseases at individual and population level: Consensus report of group 3 of joint EFP/ORCA workshop on the boundaries between caries and periodontal diseases. *J Clin Periodontol* 2017;44:S85-93.
6. Kino S, Bernabe E, Sabbah W. The role of healthcare system in dental check-ups in 27 European countries: Multilevel analysis. *J Public Health Dent* 2017;77:244-51.
7. Bombert F, Manso AC, Sousa Ferreira C, Nogueira P, Nunes C. Sociodemographic factors associated with oral health in 12-year-old adolescents: Hygiene behaviours and health appointments. A cross-sectional national study in Portugal. *Int Dent J* 2018;68:327-35.
8. Vettore MV, Moyses SJ, Sardinha LM, Iser BP. [Socioeconomic status, toothbrushing frequency, and health-related behaviors in adolescents: An analysis using the PeNSE database]. *Cad Saude Publica* 2012;28:s101-13.
9. Ruff RR, Senti S, Susser SR, Tsutsui A. Oral health, academic performance, and school absenteeism in children and adolescents: A systematic review and meta-analysis. *J Am Dent Assoc (1939)* 2019;150:111-21.e4.
10. Soares Luis HP, Assuncao VA, Soares Luis LF. Oral health habits, attitudes and behaviors of Portuguese adolescents. *Int J Adolesc Med Health* 2016;28:39-43.
11. Ghaffari M, Rakhshanderou S, Ramezankhani A, Noroozi M, Armoon B. Oral health education and promotion programmes: Meta-analysis of 17-year intervention. *Int J Dent Hyg* 2018;16:59-67.
12. Smyth E, Caamano F, Fernandez-Riveiro P. Oral health knowledge, attitudes and practice in 12-year-old schoolchildren. *Med Oral Patol Oral Cir Bucal* 2007;12:614-20.
13. Al-Darwish MS. Oral health knowledge, behaviour and practices among school children in Qatar. *Dent Res J* 2016;13:342-53.
14. Wiczorek P, Rudzki M, Lobacz M, Klichowska-Palanka M. Effect of prophylactic actions on the state of oral health and hygienic habits in a selected age group. *Ann Agric Environ Med* 2018;25:642-6.
15. Bulgareli JV, Faria ET, Cortellazzi KL, Guerra LM, Meneghim MC, Ambrosano GMB, *et al.* Factors influencing the impact of oral health on the daily activities of adolescents, adults and older adults. *Rev Saude Publica* 2018;52:44.
16. Pegon-Machat E, Jourdan D, Tubert-Jeannin S. [Oral health inequalities: Determinants of access to prevention and care in France]. *Sante Publique* 2018;30:243-51.

17. Widstrom E, Eaton KA. Oral healthcare systems in the extended European Union. *Oral Health Prev Dent* 2004;2:155-94.
18. Palvarinne R, Widstrom E, Forsberg BC, Eaton KA, Birkhed D. The healthcare system and the provision of oral healthcare in European Union member states. Part 9: Sweden. *Br Dent J* 2018;224:647-51.
19. Oancea R, Amariei C, Eaton KA, Widstrom E. The healthcare system and the provision of oral healthcare in European Union member states: Part 5: Romania. *Br Dent J* 2016;220:361-6.
20. Farmer J, Peressini S, Lawrence HP. Exploring the role of the dental hygienist in reducing oral health disparities in Canada: A qualitative study. *Int J Dent Hyg* 2018;16:e1-9.
21. Maxey HL, Norwood CW, O'Connell JB, Liu Z. Impact of state workforce policies on underserved patients' access to dental care: A longitudinal study. *J Dent Hyg* 2017;91:26-39.
22. Simmer-Beck M, Wellever A, Kelly P. Using registered dental hygienists to promote a school-based approach to dental public health. *Am J Public Health* 2017;107:S56-60.
23. Petersen PE, Baez RJ, WHO. *Oral Health Surveys: Basic Methods*. Universidade de São Paulo, Publisher, Brazil: São Paulo 2013.
24. Zhu L, Petersen PE, Wang HY, Bian JY, Zhang BX. Oral health knowledge, attitudes and behaviour of children and adolescents in China. *Int Dent J* 2003;53:289-98.
25. Swann C, Carmona C, Ryan M, Raynor M, Baris E, Dunsdon S, *et al.* Health systems and health-related behaviour change: A review of primary and secondary evidence. London: NIH 2010.
26. Nakre PD, Harikiran AG. Effectiveness of oral health education programs: A systematic review. *J Int Soc Prev Commun Dent* 2013;3:103-15.
27. Blake H, Dawett B, Leighton P, Rose-Brady L, Deery C. School-based educational intervention to improve children's oral health-related knowledge. *Health Promot Pract* 2015;16:571-82.
28. Reddy V, Bennadi D, Gaduputi S, Kshetrimayum N, Siluvai S, Reddy CV. Oral health related knowledge, attitude, and practice among the pre-university students of Mysore city. *J Int Soc Prev Commun Dent* 2014;4:154-8.
29. Langford R, Bonell CP, Jones HE, Poulidou T, Murphy SM, Waters E, *et al.* The WHO health promoting school framework for improving the health and well-being of students and their academic achievement. *Cochrane Database Syst Rev* 2014:Cd008958.
30. Jourdan D, Samdal O, Diagne F, Carvalho GS. The future of health promotion in schools goes through the strengthening of teacher training at a global level. *Promot Educ* 2008;15:36-8.
31. Ayo-Yusuf OA, Booyens S. Principal motives for toothbrushing in a population of South African adolescents: Implications for oral health promotion. *J South African Dent Assoc* 2011;66:174-8.
32. Macgregor ID, Balding JW, Regis D. Motivation for dental hygiene in adolescents. *Int J Paediatr Dent* 1997;7:235-41.
33. Shebi S, Anand S, Dhanaraj M. Knowledge, attitude and practice on oral hygiene measures among adolescents in semiurban areas. *International Journal of Current Advanced Research* 2017;6:3371-3.
34. Stokes E, Ashcroft A, Platt MJ. Determining Liverpool adolescents' beliefs and attitudes in relation to oral health. *Health Educ Res* 2006;21:192-205.
35. Al-Omiri MK, Al-Wahadni AM, Saeed KN. Oral health attitudes, knowledge, and behavior among school children in North Jordan. *J Dent Educ* 2006;70:179-87.
36. Gao J, Ruan J, Zhao L, Zhou H, Huang R, Tian J. Oral health status and oral health knowledge, attitudes and behavior among rural children in Shaanxi, Western China: A cross-sectional survey. *BMC Oral Health* 2014;14:144.
37. Prasai Dixit L, Shakya A, Shrestha M, Shrestha A. Dental caries prevalence, oral health knowledge and practice among indigenous Chepang school children of Nepal. *BMC Oral Health* 2013;13:20.
38. Jensen O, Gabre P, Skold UM, Birkhed D. Fluoride toothpaste and toothbrushing: Knowledge, attitudes and behaviour among Swedish adolescents and adults. *Swed Dent J* 2011;35:203-13.
39. Granville-Garcia A, Sobrinho J, Christian Araújo J, Ferreira J, Aparecida Menezes V, Cavalcanti A. Percepção de escolares em relação à saúde bucal. 2010;18:40-47.
40. Honkala S, Behbehani JM, Honkala E. Daily consumption of sugary drinks and foods as a behavioural risk for health of adolescents in Kuwait. *Oral Health Prev Dent* 2012;10:113-22.
41. Hall-Scullin E, Goldthorpe J, Milsom K, Tickle M. A qualitative study of the views of adolescents on their caries risk and prevention behaviours. *BMC Oral Health* 2015;15:141.
42. Maida CA, Marcus M, Hays RD, Coulter ID, Ramos-Gomez F, Lee SY, *et al.* Child and adolescent perceptions of oral health over the life course. *Qual Life Res* 2015;24:2739-51.
43. Ghaffari M, Rakhshanderou S, Ramezankhani A, Buunk-Werkhoven Y, Noroozi M, Armoon B. Are educating and promoting interventions effective in oral health?: A systematic review. *Int J Dent Hyg* 2018;16:48-58.
44. Hysi D, Eaton KA, Tsakos G, Vassallo P, Amariei C. Proceedings of a workshop, held in Constanta, Romania on 22 May 2014, on oral health of children in the Central and Eastern European countries in the context of the current economic crisis. *BMC Oral Health* 2016;16:69.
45. Mobley C, Marshall TA, Milgrom P, Coldwell SE. The contribution of dietary factors to dental caries and disparities in caries. *Acad Pediatr* 2009;9:410-4.
46. Jiang H, Petersen PE, Peng B, Tai B, Bian Z. Self-assessed dental health, oral health practices, and general health behaviors in Chinese urban adolescents. *Acta Odontol Scand* 2005;63:343-52.
47. Lawal FA, Dauda M. Non-clinical factors and predictors of self-rating of oral health among young adolescents in a rural Nigerian population. *Brazilian Journal of Oral Sciences* 2018;17:1-8.
48. Tseveenjav B, Suominen AL, Varsio S, Knuutila M, Vehkalahti MM. Do self-assessed oral health and treatment need associate with clinical findings? Results from the Finnish Nationwide Health 2000 Survey. *Acta Odontol Scand* 2014;72:926-35.
49. Lawal FB. Global self-rating of oral health as summary tool for oral health evaluation in low-resource settings. *J Int Soc Prev Commun Dent* 2015;5:S1-6.
50. Social TO. *Eurobarometer 72.3 Oral Health*. Brussels, Belgium: European Commission; 2010.
51. Patel R. *The State of Oral Health in Europe*. Brussels, Belgium: Platform for Better Oral Health in Europe; 2012.
52. Kino S, Bernabe E, Sabbah W. The role of healthcare and education systems in co-occurrence of health risk behaviours in 27 European countries. *Eur J Public Health* 2018;28:186-92.
53. WHO Global Health Expenditure Database [Internet]. World Health Organization. 2015. Available from: <http://apps.who.int/nha/database/Select/Indicators/en>. [Last accessed on July 31, 2019].
54. Inchley J. *Growing Up Unequal: Gender and Socioeconomic Differences in Young People's Health and Well-being*. Copenhagen, Denmark: World Health Organization; 2016.