

# **School-level Changes in Factors Related to Oral Health**

## **Inequalities After National Recommendation on Sweet Selling**

**Running head:** School-level changes after national recommendation

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## **ABSTRACT**

**Aims:** In 2007, Finnish authorities gave a national recommendation that schools should not sell sweet products. This study aimed to determine the effects of the national recommendation on school-level intermediary determinants (factors related to oral health inequalities) and if the changes were different according to school-level socio-economic position (SEP). **Methods:** This ecological and longitudinal study combined school-level data from two independent studies from Finnish upper comprehensive schools (N=970): the School Health Promotion study (SHPS) and the School Sweet Selling survey (SSSS). The baseline data (SHPS from 2006–2007 and SSSS from 2007), and the post-intervention data (SHPS and SSSS from 2008–2009) were combined into a longitudinal school-level data set (n=360, response rate=37%). The intermediary determinants were: attitudes and access to intoxicants; school health services; school environment; home environment, schools' health promoting actions (including sweet product selling) and pupils' eating habits. Three equal-sized school-level SEP groups: low, middle and high, were formed. The changes in the intermediary determinants were analysed using Wilcoxon Signed Ranks test. Differences between school SEP groups were analysed the using Kruskal-Wallis test. Longitudinal Linear Mixed Modelling was used to determine the contribution of intermediary determinants to the changes in pupils' eating habits. **Results:** The national recommendation was effective in decreasing sweet product selling at schools and the effect was equal in each school-level SEP group. Intermediary determinants contributed differently to eating habits in the three SEP groups. **Conclusion:** A national recommendation seems to be an effective tool in making the school environment healthier without increasing inequalities.

## **BACKGROUND**

Policies are proposed to effect favourable changes on international, national and local level. The Ottawa Charter for Health Promotion encouraged the building of healthy public policies to improve population health.[1] Macro-level policies are regarded as structural determinants in the WHO social determinants framework that combines structural and intermediary determinants of health inequalities leading to health or ill health.[2] Based on the same theory, framework for oral health inequalities suggests that unequal distribution of intermediary determinants is generating oral health inequalities.[3] Watt and Sheiham[3] state that policies to influence structural determinants in a way that the imbalance of intermediary determinants will equalise are needed. National recommendations can be considered as macro-level policies and structural determinants. They are efforts targeted at, for example, institutions, schools or work places in order to promote healthy behaviours of the citizens.

As schools are an important venue in promoting child and adolescent health, many countries or states have used national recommendations or comparable upstream actions to support pupils' healthy behaviours during the school day. A state-wide mandate obligating schools to carry out local health-promoting policies improved schools' nutrition practices in the US.[4] In Canada, a state recommendation on nutrition standards for foods and beverages was given and those schools that had implemented it sold less unhealthy products.[5] In France, a national recommendation had an effect on targeted nutrient intake in upper secondary schools that had followed the recommendation.[6] These studies indicate that national recommendations could have an effect on school food environment.

Some school policies have been effective in improving the food environment and dietary intake in schools.[7] In Minnesota, school policies promoting healthy eating were

associated with improvements in consumption of sugary drinks and fruits and vegetables.[8] School guidelines on school food environment had an effect on pupils' perception of their school-time consumption of beverages and, for some, even on the consumption of beverages outside the school day.[9] School health policies should be broad enough to impact on several risk factors of different diseases with one policy, and the first thing should be banning the sweet selling in schools.[10]

It is recommended that interventions targeted at schools should not increase the social gradient. However, it has been reported that school-based interventions could impair, improve or be neutral concerning inequalities.[11] Interventions targeted at prices or everyday environments did not widen health inequalities and could even decrease the inequalities in health.[12] A national recommendation to make school environment healthier can be regarded as a structural determinant and upstream factor, and thus, unlikely to increase oral-health inequalities.

In 2007, the National Institute for Health and Welfare (THL) and the Finnish National Board of Education (FNBE) gave a national recommendation that schools should not sell any sweet products, and that, during school day, fresh drinking water should be available and snacks sold or provided should be nutritionally appropriate.[13] Previous studies show that Finnish upper comprehensive schools have decreased the selling of sweet products after the national recommendation.[14] Also, when school-related factors were applied to the framework for oral health inequalities social gradient was observed in several intermediary determinants of oral health at school-level.[15]

**AIMS**

The aim of this study was to determine the effects of the national recommendation on school-level intermediary determinants and if the changes were different according to school-level socio-economic position. Another aim was to find out if intermediary determinants had an effect on pupils' eating habits at school, at school-level.

## **METHOD**

This ecological and longitudinal study combined data from two independent studies focusing on Finnish upper comprehensive schools (N=970). The school-level data were collected between the years 2006 and 2009, before and after the intervention (national recommendation by the FNBE and THL), and combined to form a genuine longitudinal research frame (Figure 1). The datasets were the same used and presented with more details in our previous study.[15]

The first dataset on pupils' perceived daily environment and oral health-related behaviours was collected as part of the **School Health Promotion study (SHPS)** from all eighth and ninth grade pupils (i.e. children aged 14–15 and 15–16 years old, respectively) in Finland. The study is conducted every other year at each school, half of the schools in even and half of the schools in odd years. The baseline data for this study were collected in 2006–2007 and the post-intervention data were collected in 2008–2009. The questions concerning pupils' perceived daily environment and oral health-related behaviours were part of a larger questionnaire, which included over a hundred questions on how the pupils felt about their living conditions, school conditions, health, health-related behaviour and school health services. School-level means were determined on the basis of the pupils' answers and individual answers of the pupils were not available.

In our previous study, we selected those questions of the SHPS that were applicable to the present theoretical framework, i.e. 29 questions in total.[15] If a question included multiple items (a, b, c,...k), the overall mean for the question was calculated from the item-wise means. Since, traditionally, there are no social class divisions in Finland,[16] five questions were chosen to describe the school-level socio-economic position (SEP). The questions covered parental unemployment or lay-off (range 1–3), family structure (range 1–7), highest education level the mother and the father have achieved (range 1–4) and the amount of spending money available to the pupil per week (range 1–6). The mean value was calculated to describe the school-level SEP; the lower the value, the better was the school-level SEP. The schools were also divided into three equal-sized groups based on the school-level SEP: low, middle and high.

We used four factors, which were revealed in our previous study with the same data, as the intermediary determinants of oral health inequalities.[15] These factors were revealed using explorative factor analysis from the remaining 24 questions and were called: attitudes and access to intoxicants (F1), school health services (F2), school environment (F3) and home environment (F4).[15] These factors explained 67.73% of the common variance. In addition, for this study, we chose two other questions as the intermediary determinants of oral health: eating the school meal (which parts of the school meal does the pupil eat), eating unhealthy items (such as sweets or sugar-sweetened beverages) at school apart from the school meal.

The second school-level dataset, **the School Sweet Selling survey (SSSS)**, was collected from the answers to an online questionnaire sent by email to every Finnish upper comprehensive school. The baseline data were collected in 2007, and the post-intervention data in 2008–2009. The questionnaire included 32 questions and answering took

approximately 15 minutes. The school principal or other school personnel answered the questionnaire. In a previous study, three sum variables, exposure, enabling and policy, were formed of the nine items in the questionnaire by weighting the response categories.[14] Exposure (range 0–10 points) included the actions that put the pupils' oral health at risk (what kinds of sweet products are sold and where). Enabling (range 0–10 points) included the actions that protected the pupils' oral health (are healthy products sold, does the school provide fresh drinking water or xylitol products during the school day). Policy (range 0–12 points) included the decisions behind the actions (are pupils allowed to leave the schoolyard, does the school have guidelines concerning sweet products, who are the policy decision makers). The lower the score, the better was the school's level of oral health promotion. These variables were applied to the present theoretical framework as intermediary determinants to describe the schools' oral health-related actions.

The baseline data (SHPS collected in 2006–2007 and SSSS collected in 2007), and the post-intervention data (SHPS and SSSS collected in 2008–2009) were combined into a longitudinal data set (n=360) resulting in a 37% response rate (Figure 1). The changes in the intermediary determinants were analysed using Wilcoxon Signed Ranks test.

Differences between school SEP groups were analysed using Kruskal-Wallis test. For the longitudinal multivariable analysis, Linear Mixed Modelling (LMM) was used to determine the independent contribution of each intermediary determinant to the changes in pupils' eating habits at school, a separate model for each SEP group. The dependent variable was pupils' eating habits at school at baseline and after the intervention, while the independent variables were all the intermediary determinants of oral health at baseline and after the intervention: factors F1–F4 and the school's oral health-promoting actions (the exposure, enabling and policy variables). For the model, beta and p-values were reported.

Since all the variables were coded in the same direction (the lower, the better), a positive beta coefficient indicates a positive association. Analyses were conducted using IBM SPSS Statistics 24.0.

## **RESULTS**

After the intervention, there were changes on school-level intermediary determinants: schools improved their oral health-promoting policies and decreased their sweet product selling (Table 1). Also, school-level SEP and attitudes and access to intoxicants, improved during the intervention.

The national recommendation did not increase the social gradient in intermediary determinant ‘Oral health-related actions: Exposure’ (Table 2). The decrease after the intervention in the Exposure was almost identical in every school-level SEP group: 38%, 35% and 39% in high, middle and low SEP groups, respectively. There was an inverse social gradient in exposing pupils to sweet products based on school-level SEP groups: low SEP schools did sell sweet products less often than middle and high SEP schools. Oral health-promoting policies did improve only in low school-level SEP schools after the intervention.

There was an inverse social gradient in intermediary determinants ‘eating school meal’ and ‘eating unhealthy snacks at school’ both at baseline and after the intervention: pupils ate different parts of their school meal more often in the low school-level SEP group than in the middle and high school-level SEP groups (Table 2). After the intervention, pupils ate unhealthy snacks slightly more often at school in all school-level SEP groups but the changes were not statistically significant. In high school-level SEP schools pupils’ eating habits deteriorated during the intervention.



Pupils more often ate all parts of the school meal and less often unhealthy snacks at school in those schools that did not expose their pupils to sweet products, and the difference between exposing and non-exposing schools increased further after the intervention (Table 3).

The results of the longitudinal multivariable Linear Mixed Model revealed that the school-level intermediary determinants contributed differently to pupils' eating habits in schools in different socio-economic positions (Table 4). The intermediary determinants contributed more to eating habits of the pupils in lower socio-economic position schools.

## **DISCUSSION**

The decrease in sweet product selling was equal in every school-level SEP group, suggesting that the national recommendation neither reduced nor increased the social gradient between schools' sweet product selling. Moreover, the findings from the multivariate model show that intermediary determinants contributed differently to the eating habits of the pupils in the three SEP groups. As the study was an ecological one with school-level means, care must be taken in making assumptions concerning individual effects on the pupils based on this study findings.

The strength of the study is the longitudinal design that makes it possible to measure intervention effects of the national recommendation. Also, the study had two independent datasets. The pupils answered the first questionnaire (SHPS) concerning their oral-health related behaviour, and the school principal or personnel answered the second questionnaire (SSSS) concerning school's oral-health related actions, independently of each other.

Therefore, the combined data make the study even more valid at the school level. Another strength of the study was that the SHPS is traditional and respected among upper

comprehensive schools in Finland, leading to an excellent response rate every year. However, the total response rate of this study was quite small due to low response rate in SSSS. The weakness of the study was that the questionnaires' self-reporting nature could lead to potential bias. For example, principal or school personnel could underestimate their schools' sweet product selling, or pupils could under- or overestimate their eating habits at school. On the other hand, differences between schools are smaller than differences between individuals. In both datasets, distributions of the geographical location, school size and teaching language of the responding schools was similar to the distributions of all the schools in Finland. The study population can be considered to be representative enough for the results to be generalised to all Finnish upper level comprehensive schools.

Another weakness of the study was that the first data set was a secondary analysis of data from the SHPS including only school-level means, there were no individual responses of the pupils available. We could not include the questions we wanted in the SHPS, but could only use those already available to form the school-level SEP and the factors describing the intermediary determinants of oral health inequalities. Because of large number of variables in the data sets, we think we got good measures to form SEP and intermediary determinants of oral health. We think that in Finland, it is more appropriate to use our versatile SEP measure than using only parental education, as there are traditionally no clear social classes in Finland.[16] Even though factor analysis is a data driven approach, it was chosen to diminish the number of variables in the study and it revealed factors that measure intermediary determinants of oral health and form a logical, conceptual entity. On the other hand, the school-level SEP we used cannot be compared to SEP variables used in other studies.

When assessing the significances of the findings of this study, it should be kept in mind that factors F1-F4 were formed using EFA and the limitations of the EFA were discussed in our previous study.[15] In case of multiple comparisons, use of Bonferroni corrections have been suggested. However, use of it has also been criticized and we chose not to use it, especially as we did not test general null hypothesis.[17, 18] With relatively big sample in this study, it needs to be taken into account that even if there are statistical significant changes it does necessarily not mean that the changes are important in real life. However, the sample of this study being schools, even a small change in means at school-level could have impact on many individuals and therefore, be important in real life.

Since the decrease in sweet product selling being the same in every school-level SEP group, it follows the findings that school-based interventions concentrating only on school environment have a neutral effect on social gradient or reduce inequalities.[11] The sweet product availability in schools and socio-economic position do have an influence on sugar intake, food choices and oral health.[19] In their study, if pupils had access to vending machines with unhealthy snacks at school, they had more problems related to oral health. The study showed that, at the individual level, pupils from higher socio-economic position consumed less sweet products indicating that the unhealthy products at school have bigger effect on eating habits of the pupils from lower socio-economic background. Parallel to their study, we found out that school-level intermediary determinants had bigger effect on the eating habits of pupils from lower SEP schools than in middle and high SEP schools.

Our study showed that even after the intervention high school-level SEP schools more often sold sweet products. The school intake in Finland is socially heterogeneous leading to the situation that there are also pupils from a lower socio-economic background in higher SEP schools.[16] If the findings by Maliderou *et al.*[19] apply to Finland, pupils

from a lower socio-economic background in high SEP schools could consume more sweet products than their counterparts with a higher socio-economic background. This could widen the social gradient in general and oral health.

In our study, pupils' oral health-related behaviours were poorer in those schools that had sold sweet products to their pupils. Pupils from a lower socio-economic background and boys consumed more sweetened beverages in the US study.[20] In their study, those schools that had set a guideline that sugar-sweetened beverages were not allowed in school and there was no shop in the vicinity of the school, pupils consumed less sugar-sweetened beverages. Therefore, forbidding the selling of sugar-sweetened beverages in schools could narrow the inequalities in soft-drink consumption. The most effective interventions in a school setting have been those that have taken into account the entire nutrition policy of the schools, including food availability outside the school area.[7] The association between socio-economic position and pupils' sweet product consumption is not unambiguous: in Norwegian upper comprehensive schools there was no association between pupils' SEP and sweet product consumption.[21]

In our study, there were no clear differences in the changes in pupils' oral health-related behaviours based on school-level SEP. The changes in the other intermediary determinants are not likely to result from the national recommendation but may reflect changes in the society over time. Results on the effect of schools' food environment on the pupils' sweet consumption are contradictory.[22, 23] However, most of the studies show that schools' sweet product availability increases pupils' consumption of sweet products.[7, 8, 9, 19, 20]

## **CONCLUSION**

Using a national recommendation to make the school environment healthier is an effective tool. Also, it looks like the national recommendation will not increase inequalities in schools' sweet product selling. In this study, the school-level intermediary determinants contributed more to pupils' eating habits at school in lower SEP schools. Therefore, pupils in lower SEP schools may benefit more from actions improving school environments.

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Figure 1. The datasets, the number of respondents and response rates.

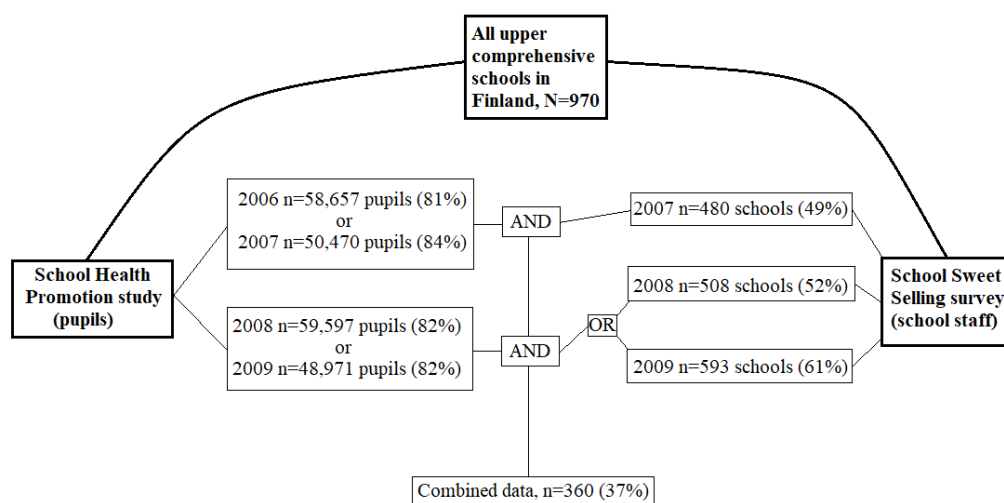


Table 1. Mean values of the school-level SEP and the intermediary determinants before and after the intervention and the statistical significance of the changes.

	2006-07	2008-09	p
SEP	2.23	2.19	< <b>0.001</b>
F1: Attitudes and access to intoxicants	1.90	1.87	< <b>0.001</b>
Chance to buy alcohol nearby	2.42	2.36	< <b>0.001</b>
Chance to buy drugs nearby	1.51	1.49	<b>0.01</b>
School's attitude towards smoking	1.78	1.75	< <b>0.001</b>
F2: School health services	2.32	2.30	0.78
Health services of the school	2.38	2.35	<b>0.02</b>
Accessibility to school health services	2.25	2.25	0.07
F3: School environment	2.05	2.04	0.27
Physical hazards of the school	2.11	2.09	0.27
Peaceful school environment	2.31	2.30	0.18
Support from teachers and/or schools	2.47	2.45	<b>0.03</b>
Stress from school	2.01	2.02	0.29
Eating circumstances in school	1.35	1.35	0.86
F4: Home environment	1.59	1.58	<b>0.01</b>
Parental support	1.78	1.77	<b>0.03</b>
Family smoking	1.40	1.39	0.08
School oral health-promoting actions: Policy	6.66	6.26	<b>0.01</b>
School oral health-promoting actions: Exposure	2.69	1.69	< <b>0.001</b>
School oral health-promoting actions: Enabling	5.12	5.25	0.20
Pupil behaviour: Eating school meal	1.23	1.24	0.16
Pupil behaviour: Unhealthy eating outside school canteen	0.72	0.74	<b>0.01</b>
Pupil behaviour: Eating habits at school	1.95	1.98	<b>0.004</b>

Table 2. The changes in intermediary determinants during the intervention according to school-level SEP. Highest and lowest 10% of the schools based on their SEP are not included to the analysis of the differences in the intermediary determinants.

		Highest SEP (N=120)	Middle SEP (N=120)	Lowest SEP (N=120)	p-value <sup>1</sup>	<i>Highest 10% SEP</i> (N=36)	<i>Lowest 10% SEP</i> (N=35)
Exposure	Baseline	3.57	2.61	1.88	<b>&lt;0.001</b>	4.11	1.09
	After intervention	2.22	1.70	1.15	<b>0.001</b>	2.89	0.91
	p-value <sup>2</sup>	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>0.001</b>		<b>0.005</b>	0.686
Enabling	Baseline	4.78	5.10	5.48	<b>0.03</b>	4.64	5.17
	After intervention	5.14	5.52	5.10	0.29	5.17	4.60
	p-value <sup>2</sup>	<b>0.045</b>	<b>0.038</b>	0.07		0.097	0.118
Policy	Baseline	6.63	6.48	6.86	0.38	6.39	6.14
	After intervention	6.18	6.29	6.30	0.94	6.14	6.51
	p-value <sup>2</sup>	0.07	0.61	<b>0.02</b>		0.739	0.259
F1: Attitudes and access to intoxicants	Baseline	2.01	1.91	1.78	<b>&lt;0.001</b>	2.07	1.75
	After intervention	1.97	1.87	1.76	<b>&lt;0.001</b>	2.01	1.72
	p-value <sup>2</sup>	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>0.006</b>		<b>0.001</b>	0.128
F2: School health services	Baseline	2.29	2.29	2.36	<b>0.003</b>	2.38	2.42
	After intervention	2.28	2.29	2.34	<b>0.010</b>	2.29	2.41
	p-value <sup>2</sup>	0.87	0.83	0.42		0.153	0.896
F3: School environment	Baseline	2.06	2.06	2.04	0.13	2.06	2.04
	After intervention	2.06	2.05	2.02	<b>0.001</b>	2.07	2.01
	p-value <sup>2</sup>	0.55	0.43	0.11		0.106	0.169
F4: Home environment	Baseline	1.58	1.59	1.59	0.63	1.57	1.61
	After intervention	1.57	1.59	1.58	0.53	1.55	1.57
	p-value <sup>2</sup>	<b>0.035</b>	0.43	0.13		<b>0.012</b>	<b>0.024</b>
Eating school meal	Baseline	1.27	1.23	1.20	<b>&lt;0.001</b>	1.28	1.17
	After intervention	1.29	1.23	1.19	<b>&lt;0.001</b>	1.31	1.15
	p-value <sup>2</sup>	<b>0.045</b>	0.50	0.73		0.293	0.278
Unhealthy snacking at school	Baseline	0.77	0.72	0.68	<b>&lt;0.001</b>	0.82	0.68
	After intervention	0.79	0.75	0.69	<b>&lt;0.001</b>	0.84	0.69
	p-value <sup>2</sup>	0.14	0.07	0.27		0.109	0.857
Eating habits in schools	Baseline	2.04	1.95	1.88	<b>&lt;0.001</b>	2.10	1.85
	After intervention	2.07	1.98	1.89	<b>&lt;0.001</b>	2.15	1.84
	p-value <sup>2</sup>	<b>0.017</b>	0.090	0.382		0.053	0.974

p-value<sup>1</sup>, the significance of the difference between the SEP groups (Kruskal-Wallis test); p-value<sup>2</sup>, significance of the change (Wilcoxon Signed Ranks test)

Table 3. Mean values of pupils' eating behaviours according to school's status of exposing their pupils to sweet products during the intervention.

	Bad all the time (n=144)	Got worse (n=15)	Got better (n=67)	Good all the time (n=134)	p <sup>1</sup>
Eating school meal at baseline	1.25	1.25	1.24	1.20	<b>&lt;0.001</b>
Eating school meal after intervention	1.27	1.32	1.22	1.20	<b>&lt;0.001</b>
p <sup>2</sup>	<b>0.01</b>	<b>0.003</b>	0.21	0.86	
Eating unhealthy snacks at school at baseline	0.75	0.74	0.73	0.69	<b>0.011</b>
Eating unhealthy snacks at school after intervention	0.78	0.81	0.71	0.71	<b>&lt;0.001</b>
p <sup>2</sup>	<b>0.01</b>	0.17	0.27	0.11	
Eating habits at school at baseline	2.00	1.99	1.97	1.89	<b>&lt;0.001</b>
Eating habits at school after intervention	2.05	1.99	1.93	1.92	<b>&lt;0.001</b>
p <sup>2</sup>	<b>&lt;0.001</b>	<b>0.017</b>	0.100	0.135	

p-value<sup>1</sup>, the significance of the difference between the groups (Kruskal-Wallis test); p-value<sup>2</sup>, significance of the change (Wilcoxon Signed Ranks test)

Table 4. Results of the longitudinal Linear Mixed Models on the changes in pupils' eating habits at school, separate model for each SEP group.

	Highest SEP		Middle SEP		Lowest SEP	
	B	p	B	p	B	p
Enabling	-0.002	0.756	0.002	0.712	-0.002	0.808
Exposure	0.012	<b>0.009</b>	0.005	0.245	0.000	0.939
Policy	-0.001	0.847	0.004	0.452	0.014	<b>0.018</b>
F1	0.254	<b>0.031</b>	0.386	<b>0.001</b>	0.307	<b>0.008</b>
F2	0.009	0.902	0.005	0.949	-0.157	<b>0.016</b>
F3	0.286	0.115	0.685	<b>&lt;0.001</b>	0.422	<b>0.014</b>
F4	0.783	<b>0.002</b>	0.163	0.545	0.3849	0.057

Appendix Table 1. Questions from the School Health Promotion study that suit the theoretical framework for oral health inequalities and scoring of the response alternatives.

<b>Variable</b>	<b>Response alternatives</b>
<b>School-level socio-economic position</b>	
1. During the past year, have your parents been unemployed or laid-off?	1: neither of my parents 2: one of my parents 3: both parents
2. Who are the adults you live with? Choose the option that best describes your situation.	1: my mother and my father 2: my mother and my stepfather 3: my father and my stepmother 4: only my mother 5: only my father 6: my husband/my wife 7: other carer
3. What is the highest educational level your mother has achieved?	1: University, university of applied sciences or other higher education institution 2: Occupational studies in addition to upper secondary school or vocational education institution 3: Upper secondary school or vocational education institution
4. What is the highest educational level your father has achieved?	4: Comprehensive school or primary school
5. On average, how much spending money do you have available per week (pocket-money or other income you can use at your own discretion)?	1: over 35€ 2: 18-35€ 3: 10-17€ 4: 7-9€ 5: 3-6€ 6: under 3€
<b>Attitudes and access to intoxicants</b>	
<b>School's attitude towards smoking</b>	
1. Is smoking allowed at your school?	1: Forbidden 2: Allowed in certain areas 3: Allowed without restrictions
2. In your school, how closely are the smoking restrictions concerning pupils monitored?	1: Very closely 2: Fairly closely 3: Hardly at all
3. Do the teachers or other personnel smoke at school or on school premises?	0: I don't know 1: No 2: Yes, sometimes 3: Yes, daily
<b>Chance to buy alcohol nearby</b>	
1. How easy is it nowadays for people your age to buy beer or cider at convenience stores, mini markets or petrol stations near your home?	1: Very difficult 2: Fairly difficult 3: Fairly easy 4: Very easy
<b>Chance to get drugs nearby</b>	
1. During the past year, have you been offered narcotic substances in Finland?	1: No 2: Yes
2. In your opinion, what opportunities does a person your age have to obtain narcotics, such as marijuana or hashish, where you live?	1: Very difficult 2: Fairly difficult 3: Fairly easy 4: Very easy
<b>School health services</b>	
<b>Health services offered by the school</b>	
1. If you have other problems than those related to school work, how easily can you get help for them from a school nurse, physician, social worker, psychologist or teacher?	1: Very easy 2: Fairly easy 3: Fairly difficult 4: Very difficult
<b>Access to health services</b>	
1. How well do your school's health services work when pupils want to discuss their personal subjects (such as sex, depression) with someone? Are you...	1: Very satisfied 2: Fairly satisfied 3: Fairly unsatisfied 4: Very unsatisfied
2. If you wanted to visit your school nurse, physician, social worker or psychologist, how easy would it be to get an appointment?	1: Very easy 2: Fairly easy 3: Fairly difficult 4: Very difficult
<b>School environment</b>	
<b>Stress from school</b>	
1. At the moment, how do you like going to school?	1: Very much 2: Rather much 3: Rather little 4: Not at all
2. Have you had any of the following feelings relating to school work? a) I feel overwhelmed by school work b) It feels that there is no point in studying c) I feel inadequate at my studies *)	1: Hardly ever 2: A few times a month 3: A few days a week 4: Almost daily
<b>Support from teachers and/or school</b>	
1. Select the alternative that best describes your opinion. a) Teachers encourage me to express my opinions in class b) Teachers are interested in how I am doing c) My teachers expect too much from me at school d) Teachers treat us fairly	1: Fully agree 2: Agree 3: Disagree 4: Fully disagree

2. If you have difficulties at school or with your school work, how often do you get help at school?

1: Whenever I need 2: On most occasions 3: Rarely 4: Hardly ever

***Peaceful school environment***

1. Select the alternative that best describes your opinion: The classroom discipline in my class is good

1: Fully agree 2: Agree 3: Disagree 4: Fully disagree

2. In your school, do the following conditions disturb your school work? a) Restless working environment b) Hurry

1: Not at all 2: Rather little 3: Rather much 4: Very much

***Physical hazards of the school***

1. In your school, do the following conditions disturb your school work? a) Crowded teaching spaces b) Noise, echoes c) Inappropriate lighting d) Insufficient ventilation or bad indoor air e) Temperature (hot, cold, draft) f) Dirt, dust g) Uncomfortable chairs or desks h) Inadequate facilities (toilets, changing rooms, showers) i) Restless working environment j) Risk of accident

1: Not at all 2: Rather little 3: Rather much 4: Very much

***Eating circumstances at school***

1. What is the mealtime environment at your school like, in general? a) The mealtime environment is pleasant b) The mealtime environment is noise-free c) The queue moves fast d) There are adults eating with us in the lunch room

1: Yes 2: No

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***Home environment***

***Parental support***

1. If you have difficulties at school or with your school work, how often do you get help at home?

1: Whenever I need 2: On most occasions 3: Rarely 4: Hardly ever

2. Which of the following alternatives best describes your family's eating habits in the afternoon or evening?

1: We enjoy a meal together and usually everyone is at the table 2: We have a proper meal, but we do not all eat at the same time 3: We do not have a proper meal, everyone grabs something to eat

3. Do your parents know most of your friends?

1: They both do 2: Only my father does 3: Only my mother does 4: Neither does

4. Do your parents know where you spend your Friday and Saturday nights?

1: Yes, always 3: Yes, sometimes 3: Most of the time they don't know

5. Can you talk about things that concern you with your parents?

1: Often 2: Fairly often 3: Every once and a while 4: Hardly ever

***Family smoking***

1. Where did you get cigarettes during the past month? a) From parents b) From siblings c) Took them from home

1: No 2: Yes

2. During your life, have your a) mother b) father smoked?

1: Never smoked 2: Used to but has quit now 3: Smokes nowadays 4: I don't know

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***Pupils' oral health-related behaviours***

***Eating school meal***

1. Which of the following alternatives best describes your school lunch eating?

1: Most often I eat the hot school lunch offered by school 2: Most often I eat the bread, drink and/or salad offered by school 3: Most often I don't eat school lunch offered by school

***Eating unhealthy snacks at school***

1. What do you eat or drink at school apart from the school meal served in the lunchroom? a) cookies b) meat pies or hamburgers c) sweets d) ice cream e) sugar-sweetened beverages f) low-calorie beverages

0: No 1: Yes

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\*) If a question includes multiple items (a, b, c,...k), the overall mean for the question is calculated from the item-wise means.

Appendix Table 2: Calculation of Exposure, Enabling and Policy variables. The smaller the score the better the actions for oral health promotion.

<b>Variable</b>	<b>Points awarded</b>
<b>Exposure (0-10 points)</b>	
Selling soft drinks (maximum 4 points)	0: Soft drinks are not sold 2: Elsewhere but not from a vending machine 3: From a vending machine without visible trademark 4: From a vending machine with visible trademark
Selling sweets (maximum 4 points)	0: Sweets are not sold 2: Elsewhere but not from a vending machine 3: From a vending machine without visible trademark 4: From a vending machine with visible trademark
Selling sweet juices, cakes, doughnuts or biscuits (maximum 2 points)	0: Are not sold 2: Are sold
<b>Enabling (0-10 points)</b>	
Providing drinking water during the school day (maximum 3 points)	0: From classrooms with mugs or from water taps in the hallway 1: From classrooms or anytime from canteen 2: From bathrooms, or during lunchtime from canteen 3: Buying from a vending machine
School's attitude towards xylitol products (maximum 3 points)	0: School provides free xylitol products 1: School sells xylitol products 2: Xylitol products are allowed 3: Xylitol products are forbidden
Selling and providing healthy snack (maximum 4 points)	0: A Healthy snack provided by school and healthy products are sold 1: A healthy snack provided by school 3: School does not provide a healthy snack but does sell healthy products 4: School does not provide a healthy snack or sell healthy products
<b>Policy (0-12 points)</b>	
Leaving the schoolyard (maximum 3 points)	0: No and it is controlled 1: No, but it cannot be controlled 2: Only at breaks or lunchtime 3: Anytime
Decision-makers of the policy (maximum 5 points)	0: At least five participants from the following: principal, teachers, pupils, parents, town, other 1: Four participants 2: Three participants 3: Two participants 4: One participant 5: No participants
Guideline's contents (maximum 4 points)	0: No consumption of sweet products and healthy snack is provided by school 1: No sweet-product selling 2: Restriction or guidance on selling or consuming 3: No guideline