

Associations between schools' guidelines and pupils' smoking and sweet consumption

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Objective: The aims were to find out if schools' sweet-selling was associated with pupils' sweet consumption, and whether the school's guideline about leaving the school area was associated with pupils' tobacco and sweet consumption. **Methods:** Two independently collected datasets from all Finnish upper secondary schools (N=988) were linked together. The first dataset on schools' sweet-selling (yes/no) and guideline about leaving school area (yes/no) was collected via school principals in 2007 using an Internet questionnaire with a response rate of 49%, n=480. The second dataset on pupils' self-reported: weekly school-time (0, never; 1, less than once; 2, 1–2 times; 3, 3–5 times), overall sweet consumption frequencies (1, never; 2, 1–2 times; 3, 3–5 times; 4, 6–7 times) and smoking and snuff-using frequencies (1, never; 2, every now and then; 3=every day) was collected in 2006–2007 in the School Health Promotion Study from pupils. An average was calculated for the school-level with a response rate 80%, n=790. The total response rate of the linked final data was 42%, n=414. Mean values of self-reported sweet and tobacco consumption frequencies between sweet-selling and non-sweet-selling schools and between schools with different guidelines were compared using Mann-Whitney test. **Results:** Pupils in sweet-selling schools and in schools without a guideline about leaving the school area, more frequently used sweet products and tobacco products than their peers in other schools. **Conclusions:** Schools may need help in building permanent guidelines to stop sweet-selling in school and to prevent leaving the school area to decrease pupils' sweet consumption and smoking.

Key words: health promotion, oral health, sweets, soft drinks, smoking, adolescent, schools, Finland

Introduction

In Finland every child is eligible for basic education free of charge (FNBE, 2013). In upper comprehensive schools for pupils aged 13 to 16 years the school day normally lasts from 8am to 2pm. Pupils do not need to take a packed lunch from home or to leave the school area to eat during the school day, since the school offers a daily free hot healthy lunch to each pupil (FNBE, 2008). One of the main targets of the "Government's resolution on development of guidelines for health, enhancing physical activity and nutrition" was to offer children and their families more information, support and opportunities to adopt healthy dietary habits and a school environment that supports them (MSAH, 2008). In addition, half of the schools also offer or sell a healthy afternoon snack to pupils (Kankaanpää *et al.*, 2012).

Thus, there is no reason for pupils to leave the school area during school hours, or for schools to arrange the selling of sweet products for pupils. The Finnish school should be an ideal environment for health promotion, especially since 99.7% of children spend much of their childhood there at a time when lifelong dietary habits are developed (FNBE, 2013; Mikkilä *et al.*, 2005; WHO, 2003). In spite of all these achievements and despite the fact that children should be entitled to a school environment that promotes their health (WHO, 2003), many schools in Finland sell sweet products on their premises (Kankaanpää *et al.*, 2012). This may be the reason why only 70–90% of the pupils daily eat the free school meal

and only 10–35% every part of the meal, since skipping the school meal is associated with eating unhealthy snacks during school hours (Raulio *et al.*, 2010).

In 2007, the Finnish National Board of Education (FNBE) and the National Institute for Health and Welfare (THL) published a recommendation that schools stop the regular selling of sweet products on their premises. After the recommendation, the number of sweet-selling schools decreased by 11% during the first year and by 18% during the second year (Kankaanpää *et al.*, 2012; Seppänen *et al.*, 2010).

Some schools justified selling by saying that pupils find their way to buy sweet products outside the school, if they are not available in the school. These schools tried to keep pupils in the school area using sweet-selling and believed that selling did not increase children's sweet consumption (Anttila *et al.*, 2012; Kankaanpää *et al.*, 2012). Despite adolescents reportedly underestimating their food consumption in food frequency questionnaires (Brenner *et al.*, 2003), American studies using pupil reports found, the availability of sugar-sweetened beverages in school vending machines and number of vending machine purchases were both positively associated with sugar-sweetened beverage intake (Shi, 2010; Wiecha *et al.*, 2006).

Some schools allow pupils to leave the school area during breaks and lunch hours or simply cannot stop them doing so. For pupils, permission to leave the school area or teachers' indifference towards monitoring it provides the possibility to buy sweets and soft drinks from

shops nearby (He *et al.*, 2012). Besides this, leaving the school area also permits pupils' school-time smoking and tobacco purchase, with smoking being more harmful for pupils' general and oral health than sweet consumption. The schools' policies control smoking especially among younger pupils (Piontek *et al.*, 2008). Adolescents in schools without regulation on smoking had an increased risk of becoming smokers than their peers in schools with regulation (Piontek *et al.*, 2008). However, schools' smoking restrictions do not work if pupils do not consider them enforced (Lovato *et al.*, 2007). On this topic, young people's self-reports of smoking estimates are reliable (Kentala *et al.*, 2004).

Finland was the first country in the world to stipulate in law that it aims to end the use of tobacco products by the year 2040 (Levy *et al.*, 2012). At the moment, smoking accessories may not be sold commercially or otherwise supplied to anyone aged under 18 and tobacco products may not be possessed by those under 18. Selling snuff is not allowed in Finland and importation is limited. Smoking by pupils or adults is not allowed in any institutions providing basic, vocational or upper secondary education: indoors or outdoors (MSAH, 2010).

Despite the actions taken to prohibit smoking and sweet-selling in Finnish schools, 15% of 8th grade (14–15 years old) pupils reported daily smoking and two thirds of them reported doing it at least every now and then in the school area (THL, 2011). In addition, 40% of the Finnish schools still continue selling sweet products on their premises (Seppänen *et al.*, 2010). According to the authors' knowledge, there are no previous studies of the relationship between the possibility to leave the school area and pupils' sweet consumption and smoking frequencies.

The aim of this study was to find out if schools' sweet-selling was associated with pupils' weekly sweet consumption frequency or with where they bought snacks during school hours. Another aim was to find out whether the schools' guideline about leaving the school area during the school day were associated with pupils' sweet consumption, smoking and snuff-using frequencies, where they bought snacks and tobacco and their perception of the school's smoking restriction and its monitoring.

Material and methods

This cross-sectional study, implemented by the University of Turku, linked together two independently collected datasets from all 988 Finnish upper comprehensive schools whose pupils were aged 13–16 years. There were almost 200,000 pupils across these schools. Both datasets were collected before the 2007 recommendation about sweet-selling in schools, which makes this study a baseline study.

The first dataset on schools' oral-health-related practices included information about the selling of sweets, soft drinks and other sweet products, and the school's guideline about leaving the school area. Data were collected online from school principals in 2007. Questions on sweet-selling and guidelines about leaving the school area were part of a larger 34 question questionnaire for principals. That questionnaire was developed by modifying one used in the longitudinal study by the Swedish

Dental Associations' "Dentists against sweets and soft drinks in school" (SDA, 2010). Answering took approximately fifteen minutes. The response rate for the first dataset was 49%, $n=480$.

Principals were asked if sweets, soft drinks or other sweet products were sold in their school in a vending machine, tuck shop, café or canteen. Other sweet products included sweet juices, cakes, doughnuts and biscuits. A dichotomised sweet-selling variable was created by combining the variables of selling sweets, soft drinks and other sweet products. If the school fell into none of these three categories it was coded 'non-selling', 'sweet-selling' if belonging to one or more of the categories.

A guideline variable about leaving the school area was formed from the question "Are pupils allowed to buy something to eat or drink outside the school area, for example, from a shop or a kiosk" Response alternatives were: 1, yes, during lunch hours; 2, yes, during breaks; 3, yes, anytime; 4, no, and it's monitored; 5, no, but pupils leave without permission. The guideline variable was dichotomised so that only response alternative 4 was considered as stopping leaving the school area and defined as "school with guideline". All the other alternatives were considered permitting leaving and coded as "school without guideline".

The second dataset on pupils' oral health behaviour was collected as part of the School Health Promotion Study, which has been implemented every second year with all the 8th and 9th grade pupils in Finland since 1996. The study was implemented in Southern, Eastern and Northern Finland in spring 2006, and in Western and Central areas a year later. Questions about pupils' oral-health-related behaviour were part of a larger questionnaire (THL, 2013) where pupils answered over 100 questions about their living conditions, school conditions, health, health-related behaviour, and school health services. In 2006 81% ($n=58,657$) and in 2007 84% ($n=50,470$) of the pupils answered the questionnaire. An average was calculated for the school level with a response rate of 80%, $n=790$ schools. Data included the school-level mean values of pupils' self-reported sweet consumption frequencies (sweets, sugar-sweetened soft drinks, sugar free soft drinks, ice cream and sweet pastries [including buns, biscuits, cakes, etc.] in school hours (0, never; 1, less than once; 2, 1–2 times; 3, 3–5 times per week) and anytime (1, never; 2, 1–2 times; 3, 3–5 times; 4, 6–7 times per week), place where they got snacks (from school snack serving, from school vending machines, from shop, stall or petrol station, from home, each coded 0, no; 1, yes), smoking frequency during school hours in the school area, outside the school area and on the way to school (1, never; 2, every now and then; 3, every day), snuff-using frequency (1, never; 2, every now and then; 3, every day), perception of school's smoking restriction (1, totally forbidden; 2, allowed in certain places; 3, allowed without limitations), perception of the strictness of monitoring the smoking restriction (1, very strictly; 2, quite strictly; 3, not at all) and where they bought cigarettes during the past month (from somewhere, shop, kiosk, petrol station, bar, vending machine, friends or somewhere else, each coded 1, no; 2, yes). Overall mean values for consumption of different sweet products were calculated for school-time and overall sweet consumption

frequencies. The questions about the frequency of smoking and place to buy tobacco were asked only from pupils who reported smoking at least once a week.

For the final data these two school-level datasets were linked manually by school name and location. The total response rate for the final data was 42%, 414 schools. The association between the selling of sweet products and the guideline about leaving the school area was evaluated with the chi-square test. The school-level mean values of the pupil-reported sweet consumption frequencies and place where they got snacks between sweet-selling and non-selling schools and between schools with and without a guideline about leaving the school area were compared using Mann-Whitney tests. The school-level mean values of the pupil-reported smoking, snuff-using, perception of the school smoking restriction and its monitoring and the place where they got tobacco between the schools with and without a guideline about leaving the school area were compared using Mann-Whitney tests. To evaluate

if association between school-time sweet consumption frequency (total mean) and schools' sweet-selling and guideline can be observed when considering province, teaching language and number of pupils in the school as confounders, 5-way ANOVA was conducted. To evaluate if association between school-time smoking and guideline can be observed when considering province, teaching language and number of pupils in the school as confounders, 4-way ANOVAs were conducted, with separate models for smoking in and outside the school area.

Results

Of the responding 414 schools, 59% were sweet-selling and 51% had no enforced guideline about leaving the school area, with 31% being in both categories and 21% in neither. Sweet-selling and guideline about leaving the school area were not associated ($p=0.355$).

Table 1. The school-level distribution (min-max, 25%, 75%) as well as mean values ($n=414$) for pupil-reported school-time sweet consumption frequencies (0, never; 1, less than once; 2, 1–2 times; 3, 3–5 times per week) in non-selling and sweet-selling schools, and in schools with and without a guideline about leaving the school area (Mann-Whitney test).

	Distribution			Sweet-selling			Guideline		
	Min-max	25%	75%	No	Yes	<i>p</i>	Yes	No	<i>p</i>
Sweets	0.33–1.60	0.77	1.10	0.89	0.96	0.002	0.83	1.03	<0.001
Sugar-sweetened soft drinks	0.32–1.33	0.66	0.95	0.77	0.84	0.001	0.72	0.90	<0.001
Sugar free soft drinks	0.30–1.08	0.55	0.75	0.62	0.67	0.001	0.59	0.71	<0.001
Ice cream	0.29–1.40	0.57	0.78	0.65	0.69	0.026	0.61	0.73	<0.001
Sweet pastries	0.29–1.50	0.53	0.71	0.61	0.64	0.012	0.58	0.67	<0.001
Overall mean	0–1.93	0.63	0.87	0.71	0.76	0.003	0.67	0.81	<0.001

Table 2. The school-level distribution (min-max, 25%, 75%) as well as mean values ($n=414$) for pupil-reported overall sweet consumption frequency (1, never; 2, 1–2 times; 3, 3–5 times; 4, 6–7 times per week) in non-selling and sweet-selling schools, and in schools with and without a guideline about leaving the school area (Mann-Whitney test).

	Distribution			Sweet-selling			Guideline		
	Min-max	25%	75%	No	Yes	<i>p</i>	Yes	No	<i>p</i>
Sweets	1.00–2.48	2.10	2.24	2.16	2.17	0.137	2.16	2.18	0.022
Sugar-sweetened soft drinks	1.00–2.62	1.89	2.06	1.95	1.98	0.082	1.96	1.98	0.102
Sugar free soft drinks	1.00–1.76	1.35	1.47	1.39	1.42	0.002	1.40	1.42	0.005
Ice cream	1.25–2.38	1.71	1.87	1.79	1.79	0.575	1.78	1.79	0.464
Sweet pastries	1.00–2.15	1.32	1.54	1.47	1.42	0.001	1.47	1.42	0.002
Chocolate	1.00–2.38	1.82	2.03	1.92	1.93	0.205	1.91	1.95	0.006
Overall mean	1.00–2.56	1.74	1.83	1.78	1.79	0.219	1.78	1.79	0.093

Table 3. School-level percentages ($n=414$) for pupil-reported place to get snacks during school time in non-selling and sweet-selling schools, and in schools with and without a guideline about leaving the school area (Mann-Whitney test).

	Sweet-selling			Guideline		
	No	Yes	<i>p</i>	Yes	No	<i>p</i>
From school snack serving	14	22	<0.001	18	19	0.617
From school vending machines	4	11	<0.001	7	10	<0.001
From shop, kiosk or petrol station	30	34	0.048	24	40	<0.001
From home	17	16	0.209	18	15	0.007

The school-level mean values for pupils' school-time sweet consumption frequencies for different products were statistically significantly higher in the sweet-selling than in the non-selling schools in sweets, sugar-sweetened soft drinks, sugar free soft drinks, ice cream and sweet pastries (Table 1). There were no statistically significant differences in pupils' overall sweet consumption frequencies according to schools' sweet-selling except in sugar free soft drinks and sweet pastries (Table 2). School-level percentages for pupils' self-reported school-time place to get snacks were statistically significantly higher in sweet-selling than in non-selling schools in all the other places but "home" (Table 3).

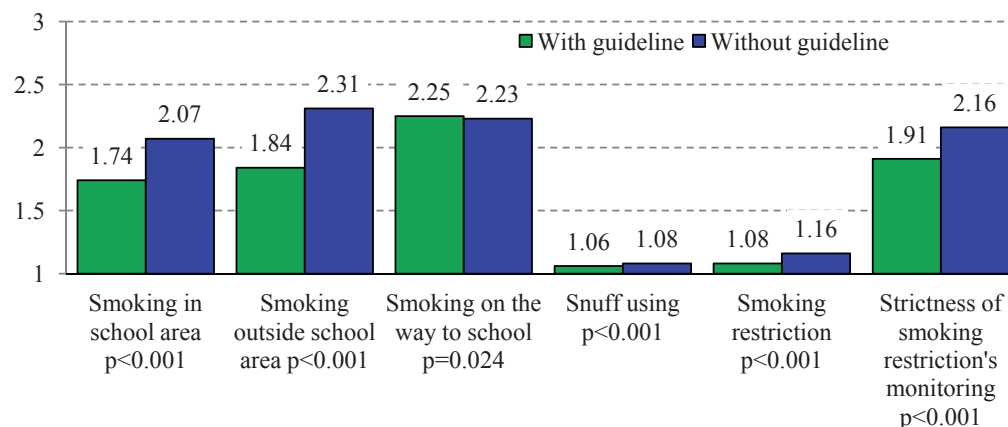
The mean values for pupils' school-time sweet consumption frequency of different products were statistically significantly lower in schools with a guideline about leaving the school area than in schools without it in sweets, sugar-sweetened soft drinks, sugar free soft drinks, ice cream and sweet pastries (Table 1). Also the mean values for pupils' overall consumption frequency of sweets, sugar free soft drinks and chocolate were statistically significantly lower in schools with a guideline than in schools without it (Table 2). In schools with a guideline, school

level percentages for pupils' self-reported school-time place to get snacks were statistically significantly lower in "school vending machines" and "shop, stall or petrol station" but higher in "home" than in schools without a guideline (Table 3).

The mean values for snuff-using frequency and school-time smoking frequency in the school area and outside the school area were lower in schools with a guideline about leaving the school area than in schools without it. The mean value for smoking frequency on the way to school was a little bit higher in schools with a guideline about leaving the school area than in schools without it. In schools with a guideline about leaving the school area, pupils experienced the schools' smoking restriction as being stricter and more strictly monitored than in schools without a guideline (Figure 1).

School-level mean values for the question about whether pupils, who smoke at least once a week, have bought tobacco during the previous month, were statistically significantly lower in the alternatives "from shop" and "from kiosk", but higher in the alternative "from friends", in schools with a guideline about leaving the school area than in schools without a guideline (Figure 2).

Figure 1. School-level mean values ($n=414$) for pupil-reported school-time snuff using and smoking frequencies (at least once a week smokers) in the school area, outside the school area and on the way to school, pupils' self-reported perception of school's smoking restriction and its monitoring in schools with and without a guideline about leaving the school area (Mann-Whitney test)

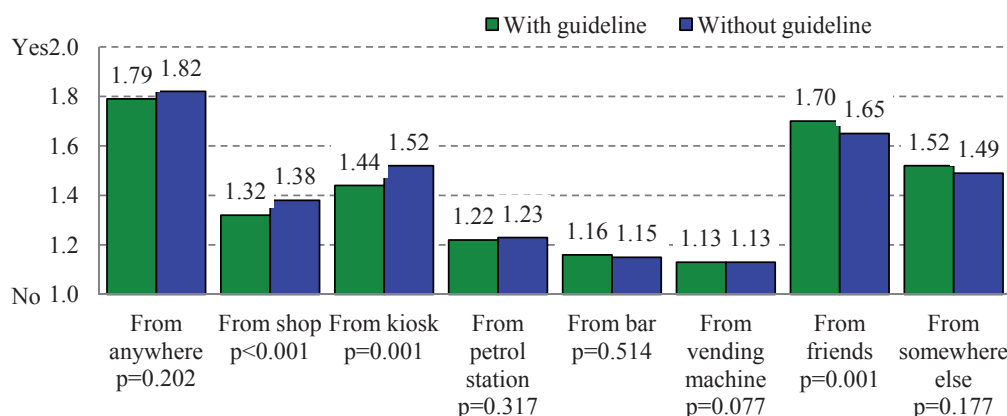


Notes: Smoking and snuff using coded: 1, never; 2, every now and then; 3, every day

Perception of school's smoking restriction coded: 1, totally forbidden; 2, allowed in certain places; 3, allowed without limitations

Strictness of smoking restriction's monitoring coded: 1, very strictly; 2, quite strictly; 3, not at all

Figure 2. School-level mean values ($n=414$) for the pupil-reported question about whether pupils, who smoke at least once a week, have bought tobacco during the previous month from anywhere, from shop, kiosk, petrol station, bar, vending machine, friends or somewhere else (1, no; 2, yes), in schools with and without a guideline about leaving the school area (Mann-Whitney test)



Results of the ANOVAs revealed that even when considering province, teaching language and number of pupils in the school as confounders, the mean sweet consumption frequency in the school time was associated with sweet-selling ($p=0.014$) and guideline ($p<0.001$) of the schools. Also, even when considering province, teaching language and number of pupils in the school as confounders, school-time smoking was associated with guideline of the schools, both in the school area ($p<0.001$) and outside the school area ($p<0.001$).

Discussion

In sweet-selling schools and in schools without a guideline about leaving the school area, pupils more frequently used sweet products and tobacco products than their peers in other schools.

The strength of this study was the use of two independently collected datasets, which were linked together. There were also different respondents in the questionnaires, since the first questionnaire was answered by the school principal and the second by pupils. This makes the study even more valid at the school level, because they responded independently of each other. Another strength of the study was the breadth and esteem of the School Health Promotion study in Finnish upper comprehensive schools, which is reflected in the excellent response rate of the second dataset. A weakness of this study is the modest response rate for the first dataset partly offset by the other dataset's high response rate. Only school-level mean values of pupils' sweet consumption frequencies were available, which is another weakness of the study.

It is possible that the principals who answered the first questionnaire are from schools which are more active in health promotion than schools whose principals did not answer. The big challenge in these kinds of voluntary questionnaires is to get normally passive schools to report their situation. The hypothesis that the schools not selling sweet products are the same schools which did not let their pupils leave the school area to buy sweet products during school hours, was not supported by the data. While with this study's large sample even small differences may be statistically significant, at the population level even small differences can be meaningful and a small change may be important for the health of some.

In both datasets the geographical distribution of the responding schools was similar to the geographical distribution of all the schools in Finland. The study population can be considered representative enough for the results to be generalised to all Finnish upper level comprehensive schools.

Few studies have explored the relationship between the availability of sweet products in schools and pupils' sweet consumption (Shi, 2010; Wiecha *et al.*, 2006). According to the authors' knowledge, no previous studies have considered the school-level relationship between school's sweet-selling and pupils' sweet consumption frequency, or between the guideline about leaving the school area and pupils' sweet consumption and smoking frequencies. However, our school-level findings support the previous pupil-level studies about the positive relationship between the availability of sweet products in schools and pupils' sweet consumption (Shi, 2010; Wiecha *et al.*, 2006).

School sweet-selling and lack of a guideline about leaving the school area were reflected as pupils' higher sweet consumption frequency in school hours. The lack of guideline was also reflected as pupils' higher overall sweet consumption frequencies especially for sweets, sugar free soft drinks and chocolate. School sweet-selling was not associated with the overall consumption statistically significantly despite the trend being similar to school-time consumption frequency.

Only in the overall consumption of sweet pastries was the difference in the opposite direction for the school being sweet-selling and having a guideline. Smaller differences in overall sweet consumption frequencies and especially reversed direction differences in sweet pastries may result from pupils finding sweet consumption at school difficult compensating for this after school. Sweet pastries are, however, better alternative for oral health than sweets and soft drinks, because pupils are not snacking them all day long. At least a school-day-lasting break from consuming sweet is very important for pupils' oral health, since it interrupts the acid attack on their teeth (Rugg-Gunn, 2013). Most importantly, a school with a guideline and without sweet-selling provides pupils with lifelong models for moderate sweet consumption, priceless for pupils' futures and ethically sound (WHO, 2003).

Sweet-selling in school was not a good way to keep pupils in the school area, since it seemed that pupils in sweet-selling schools also got snacks outside the school area from shops, kiosks or petrol stations more often than pupils in non-selling schools. Forbidding selling was not reflected as higher frequency of taking snacks from home, since pupils in non-selling schools took snacks from home as frequently as pupils in sweet-selling schools.

A guideline about leaving the school area seems to be a good way to decrease pupil's school-time sweet consumption and smoking frequencies. For some adolescents a school day may be a good chance for unhealthy eating or smoking without their parents knowing about it. For others school may provide the only healthy environment in their lives without continuous unhealthy eating or smoking accepted or even supported by their parents at home. In both these situations the responsibility of the school is to give pupils a safe and healthy school day. A guideline about leaving the school area did not make pupils buy their snacks more often from school vending machines, since pupils in schools with a guideline got their snacks from vending machines less often than their peers in schools without a guideline. However, the schools without a guideline about leaving the school area may increase the sales of nearby shops, kiosks and petrol stations but at the same time jeopardised pupils' health.

Schools' indifference towards pupils leaving the school area also seemed to be reflected in pupils' attitudes towards the school smoking restrictions, and as pupils' higher use of tobacco products both inside and outside the school area. It was also reflected as pupils' more frequent buying of tobacco from shops and kiosks near the school. The Finnish tobacco control programme is a good example of the Health in All Policies approach, where health is promoted in the agendas of different sectors of the society (MSAH, 2013). However, the goal of a tobacco-free Finland by 2040 will not be achieved without credible school smoking restrictions followed

by both schools and shopkeepers, and monitored by the government (Levy, *et al.*, 2012, Lovato *et al.*, 2007; MSAH, 2010).

Schools need encouragement to implement and enforce guidelines to stop sweet-selling in school and to prevent pupils leaving the school area, to decrease pupils' sweet consumption and smoking in school hours. The roles of excessive sugar intake and smoking as common risk factors for many diseases should be taken as an opportunity to create and monitor these guidelines through co-operation among school, pupils, teachers, parents, shopkeepers and health care (Sheilham and Watt, 2000). Schools can no longer justify sweet-selling by saying that it does not increase pupils' sweet consumption in the school time; this may encourage decision makers to forbid the selling of sweets and soft drinks in school by law.

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