

Factors underlying compliance with a healthy snacking initiative in the school environment: accounts of school principals in Montevideo (Uruguay)

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Abstract

Objective: To evaluate the implementation of the Uruguayan healthy snacking initiative in primary and secondary schools in the capital, and to explore the factors underlying compliance from the perspective of school principals.

Design: A mixed-method approach was used, which included semi-structured interviews with school principals and a survey of the foods and beverages sold and advertised in the schools.

Setting: Primary and secondary schools in Montevideo (the capital city of Uruguay).

Participants: School principals.

Results: The great majority of the schools did not comply with the initiative. Exhibition of non-recommended products was the main cause for non-compliance, followed by advertising of non-recommended products through promotional activities of food and beverage companies. Although school principals were aware of the healthy snack initiative and showed a positive attitude towards it, the majority lacked knowledge about its specific content. Factors underlying compliance with the healthy snacking initiative were related to its characteristics, characteristics of the schools, and external factors such as family habits and advertising.

Conclusions: Results showed that the rationale underlying the selling of products at schools favours the availability of ultra-processed products and constitutes the main barrier for the promotion of healthy dietary habits among children and adolescents. Strategies aimed at facilitating the identification of unhealthy foods and beverages and provision of incentives to canteen managers to modify their offer are recommended.

Keywords:
Schools
Food environment
Childhood obesity
Nutrition policy

Childhood overweight and obesity have increased at an alarming rate and have become one of the most important public health problems worldwide⁽¹⁾. It has been estimated that more than 20% of Latin American children and adolescents aged between 0 and 19 years are overweight and obese⁽²⁾. In particular, Uruguay shows one of the highest prevalence rates of childhood overweight and obesity on the continent. In 2005, 30.7% of school-aged children were overweight or obese (21.4 and 9.3%, respectively)⁽³⁾, whereas in 2016 the prevalence of overweight and obesity in 10–13-year-old children was 38.7% (25.7 and 13.0%, respectively)⁽⁴⁾.

Changes in children's dietary patterns have been identified as one of the main drivers of the epidemic of childhood overweight and obesity in Latin America^(2,5). These changes have been explained by complex social, cultural and economic factors, which include an improvement in socio-economic conditions, urbanization, the rise in the number of working mothers and changes in the food environment⁽⁶⁾. The contribution of the food environment, and particularly the high availability of ultra-processed products with high energy density and high sugar and fat content, to the global obesity epidemic is increasingly recognized⁽⁷⁾. Thus, policies that introduce changes in the food environment have been

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deemed necessary to develop preferences for healthy foods, to encourage people to reassess their preference for unhealthy foods and to overcome barriers for the consumption of healthy foods⁽⁸⁾. Such policies have been identified as more effective than those targeted at changing individuals' eating patterns^(9,10).

Schools play an important role in the life of children and adolescents and have been highlighted as a key environment for the promotion of healthy eating patterns and for obesity prevention^(8,11). School environments influence the availability, affordability and consumption of foods and beverages, and have the potential to modify social norms and to shape children's attitudes towards both healthy and unhealthy foods and beverages^(12,13). Specific strategies to modify the availability and affordability of foods and beverages in schools include provision of fruits and vegetables, nutrient-based standards for foods, beverages and meals available in schools and changes in the presentation of foods and beverages at the point of purchase⁽⁸⁾.

Foods and beverages consumed in schools have been identified as an important source of energy and nutrients in children's diet⁽¹⁴⁾. They can be part of the main meal, which may be controlled by formal school meal programmes, or can also be consumed as snacks outside the main meals⁽¹⁵⁾. Foods sold at schools outside formal meal programmes, usually called 'competitive foods', have become widely available in schools worldwide and have been reported to frequently have high content of added sugar, fat and sodium^(16,17). Availability of unhealthy foods and beverages in the school setting has been reported to decrease the likelihood of selecting healthy options⁽¹⁸⁾ and to create inconsistent messages to children on the foods and beverages that are more appropriate for them⁽¹⁹⁾. For these reasons, restrictions on the availability of unhealthy foods and beverages in school settings have been introduced in several countries⁽¹³⁾. However, limited information on the factors underlying the success of such policies is available to support their design and implementation⁽²⁰⁾.

The Uruguayan healthy snacking initiative

In the context of the alarming rise in childhood overweight and obesity, in 2013, Uruguay passed a law to protect the health of children and adolescents who attend educational institutions through the promotion of healthy dietary habits, commonly known as the 'healthy snacking initiative'⁽²¹⁾. One of the main objectives of the law is to promote consumption of nutritionally adequate foods and beverages among children and adolescents by increasing their availability in school canteens. The law specifies that the Ministry of Health is responsible for preparing a list of nutritionally adequate foods and beverages targeted at educational institutions (students, teachers, administrative staff and parents).

In 2014, the Ministry of Health published a decree where it established three groups of foods and beverages recommended for sale in Uruguayan educational institutions: (i) natural or minimally processed foods and beverages; (ii) foods and beverages prepared at the point of sale using recommended ingredients in adequate proportions; and (iii) packaged processed products that comply with requirements regarding their content of energy and key nutrients⁽²¹⁾. In 2014, the maximum content of energy, fat, saturated fat, *trans* fat, sugars and sodium in processed products were established in a separate regulation⁽²²⁾.

The regulatory decree also includes a definition of advertising and explicitly states that exhibition of products at the point of sale is a type of advertising. In addition, it establishes a series of recommendations to promote consumption of healthy products: 60% of all the products available for sale should be included in the list of recommended products and 50% of the exhibited products should be natural or minimally processed⁽²³⁾.

Four years after the implementation of the initiative no information is available regarding its compliance or how it is perceived by stakeholders. This highlights the need to conduct research on the topic to determine the extent to which Uruguayan schools have implemented the initiative and to obtain insights to assist its implementation and the development of accompanying public policies.

Aims and overview of the present study

The aims of the present work were to evaluate the implementation of the Uruguayan healthy snacking initiative in primary and secondary schools in Montevideo, and to explore the factors underlying compliance from the perspective of school principals. Results from the present work are expected to provide insight on the main factors that should be taken into account for successful implementation of healthy snacking initiatives in school settings, as well as on the accompanying policies that are necessary to promote healthy dietary habits in children and adolescents.

Materials and methods

Sample selection

The total number of primary schools in Montevideo (the capital city of Uruguay) is 426, which includes 253 public schools and 173 private schools, whereas the number of secondary schools is 183, which comprises seventy-five public secondary schools and 108 private secondary schools. A random sample of sixty-one schools (10% of the universe) was obtained using stratified random sampling considering education level (primary *v.* secondary) and type of school (public *v.* private).

In each school, the principal was contacted by telephone and the objectives of the study were explained. If principals agreed to participate, a visit to the school and an interview

were coordinated. When the principals did not agree to participate in the study, another school was re-sampled with the same characteristics in terms of education level and type of school. Due to time limitations, the total number of schools in the final sample was fifty-nine: thirty-eight primary schools (twenty-four public and fourteen private) and twenty-one secondary schools (eight public and thirteen private).

The study was approved by the Ethics Committee of the School of Chemistry of Universidad de la República (Uruguay). Participants signed informed consent forms before the interview and received no compensation for their participation.

Data collection

A mixed-methods approach was used to explore implementation of the healthy snacking initiative. In each school, a semi-structured interview was conducted with the principal to assess awareness of the content of the healthy snacking initiative, general perception, perceived compliance with its requirements, barriers and facilitators for compliance, as well as suggestions of additional strategies for promoting healthy eating patterns in children and adolescents. The interviews were conducted by six different researchers following a general question guide specially developed for the study (Table 1). The interviews were audio recorded and then transcribed.

After the interview, authorization from the school principal was obtained to survey the foods and beverages sold at the school. All products sold, exhibited and advertised were registered at the point of sale by one of the researchers. Products only sold for lunch were not included in the survey. Detailed information about the products, including nutritional information of packaged products, was obtained. A standard checklist was developed in a pilot test and used in all schools.

The existence of food advertising in the schools was also surveyed, including point-of-sale advertising (posters, billboards, shelf edging, display stands, etc.) and product exhibition at the point of sale. Information about promotional activities developed by food and beverage companies in the schools (tours, talks, educational activities) and

gifts/products given to students was collected in the interviews with the school principals.

Data analysis

Foods and beverages sold and advertised at schools

The total number of products sold at each school was surveyed. The identified products were classified according to the criteria of the Ministry of Health⁽²²⁾: (i) natural or minimally processed foods and beverages; (ii) foods and beverages prepared at the point of sale; (iii) packaged processed products that comply with the requirements regarding their content of energy and key nutrients; and (iv) packaged processed products that do not comply with the requirements regarding their content of energy and key nutrients. The number of products in each category was determined for each school.

Regarding food advertising, the type of products advertised using each of the strategies was determined in each school. The percentage of schools where foods and beverages were advertised using different strategies was calculated by education level and type of school (public *v.* private).

Compliance with the law

Compliance with the healthy snacking initiative in each school was determined based on advertisement of packaged processed products that did not comply with requirements regarding their content of energy and key nutrients. The percentage of schools that complied with the law was determined per education level and type of school (private *v.* public). Compliance with recommendations regarding the availability of recommended products was also assessed.

Content analysis of the interviews

Interview recordings were transcribed and analysed using content analysis⁽²⁴⁾. A deductive/inductive process was used to identify emerging themes and categories by two researchers. First, interview fragments discussing each of the main themes of the interviews were identified and assigned to the following themes: (i) implementation of

Table 1 Questions included in the semi-structured interviews conducted with school principals in Montevideo (Uruguay)

Question
Do you know the law of healthy eating (Law 19140)?
Are you aware of its scope and content? How did you learn about it?
Did you receive any educational material, guidelines, orientation or training about it?
Do you remember who sent it/them?
Are foods and beverages sold inside the institution? Who is responsible for the selling of foods and beverages? Is any type of control made on the foods and beverages that are sold in the school?
Has any food and beverage company developed activities in the school or given products or gifts to students?
Do you think your institution complies with the provisions of the law?
From your point of view, what are the major barriers for compliance with the law?
Do you have any recommendation for improving the law and its compliance?
Have you implemented any strategy in the school to improve the eating habits of children/adolescents?

the healthy snacking initiative; (ii) compliance with the initiative and factors underlying compliance; and (iii) strategies to promote healthier eating patterns among children and adolescents. For each theme, categories and sub-categories were identified as they emerged when examining and re-examining the transcripts. Interview fragments were assigned to the categories and sub-categories separately by each of the two researchers. After they individually completed the task, a meeting between the researchers was held to solve the disagreements by open discussion and establish the final coding. Examples of quotes were selected for each category and sub-category and translated into English.

Results

Foods and beverages sold in the schools

Foods and beverages were sold in the majority of schools, regardless of education level or type of school. However, as shown in Table 2, the percentage of schools that sold foods and beverages was higher for secondary schools than for primary schools, particularly in the case of public schools. As shown in Table 2, sales in public primary schools were organized by the principal/staff, parents or students for raising funds for school activities. Meanwhile, in secondary schools, sales of foods and beverages were implemented through school canteens under the responsibility of outsourced third parties (Table 2). In the case of private primary schools, sales were mainly organized by school staff or outsourced third parties (Table 2).

According to the results of the survey, a large difference was found in the variety of products sold in private and public schools, as well as between public and private primary schools. As shown in Table 2, the average number of products sold at public primary schools was 7.8,

whereas 20.7 products were sold in private primary schools and close to 40 in secondary schools.

The proportion of products in each of the categories defined by the Ministry of Health is shown in Table 2. Natural and minimally processed foods and beverages (fruit, fruit chips, dried fruit and nuts, milk, fruit juices and mineral water) represented only 10–18% of the products, regardless of educational level and type of school. Foods and beverages prepared at the point of sale and homemade foods and beverages represented 22–47% of all the products sold at schools, corresponding to cakes, cookies, *alfajores* (a traditional product in Uruguay, composed of two pieces of dough or biscuit separated by *dulce de leche* (a type of sweetened condensed milk) which is usually covered with chocolate), pastries, cereal bars, quiches and pizza. Meanwhile, processed products accounted for 43–67% of all the products sold at schools and were the most widely available product category sold at schools, except for public primary schools (Table 2). Most processed products sold in schools did not meet the nutritional criteria defined by the Ministry of Health. They mainly corresponded to cookies and crackers, *alfajores*, cereal bars, dairy products (yoghurt, flavoured milk, dairy desserts), soda, fruit juice, candies and hot dogs.

Advertising of foods and beverages in the schools

All the schools offering foods and beverages for sale exhibited the great majority of the available products. As shown in Table 3, all the categories identified by the Ministry of Health, including packaged processed products that did not meet nutritional criteria, were exhibited in all secondary schools. Although sales of foods and beverages in primary schools were less frequent, packaged processed products that did not meet nutritional criteria were still exhibited in 42% of the public primary schools and 71% of the private primary schools (Table 3).

Table 2 Characteristics of the sales of foods and beverages, by education level and type of school, in a sample of primary and secondary schools in Montevideo (Uruguay), July–November 2016

	Education level			
	Primary		Secondary	
	Public (n 24)	Private (n 14)	Public (n 8)	Private (n 13)
Percentage of schools that sell foods and beverages (%)				
Responsible for the sales of foods and beverages	58	86	100	100
Principal/staff	57	64	0	0
Outsourced third party	0	36	100	100
Parents	29	0	0	0
Students	14	0	0	0
Average number of products sold	7.8	20.7	44.6	39.6
Percentage of products in each of the categories defined by the Ministry of Health (%)				
Natural or minimally processed foods and beverages	10	11	15	18
Foods prepared at the point of sale/Homemade foods and beverages	47	22	30	33
Processed packaged products that meet nutritional criteria	5	9	1	7
Processed packaged products that do not meet nutritional criteria	38	58	54	43

Direct advertising of foods and beverages at the point of sale (through fridges, banners and floor stand displays) was observed in the survey in all types of schools except for public primary schools. Although this practice was not frequent in private primary or secondary schools, 63% of the public secondary schools showed some type of advertising at the point of sale (Table 3). The advertised products corresponded to soda, water, flavoured water, packaged juices and ice creams.

In addition, according to the accounts of the school principals, advertising was also conducted through activities of food and beverage companies inside primary schools (Table 3). The advertising activities consisted of visits to the companies, printed material with brands, games, gifts and informative talks. The companies responsible for these activities were mainly manufacturers of *alfajores*, jams and marmalades, sugary drinks and fast foods.

Compliance with the healthy snacking initiative

Compliance with the provisions of the healthy snacking initiative was evaluated in the selected sample of primary

and secondary schools. As shown in Table 4, the great majority of the schools did not comply with the initiative. However, it is worth noting that compliance was markedly higher in primary schools compared with secondary schools (Table 4). Exhibition of non-recommended foods and beverages was the main cause for non-compliance, followed by advertising of non-recommended products in the schools through promotional activities of companies.

Regarding the recommendations to promote consumption of healthy products, in only eleven of the thirty-six schools that sold foods and beverages less than 40% of the products corresponded to non-recommended products. Meanwhile, none of the schools that sold foods and beverages complied with the recommendation that 50% of the exhibited products should be natural or minimally processed.

Accounts of school principals and factors underlying compliance with the healthy snacking initiative

The great majority of the school principals were aware of the existence of the healthy snack initiative (Table 5) and

Table 3 Characteristics of the advertising of foods and beverages, by education level and type of school, in a sample of primary and secondary schools in Montevideo (Uruguay), July–November 2016

	Education level			
	Primary		Secondary	
	Public (n 24)	Private (n 14)	Public (n 8)	Private (n 13)
Percentage of schools that exhibited foods and beverages at the point of sale (%)	58	86	100	100
Natural or minimally processed	33	54	100	100
Foods and beverages prepared at the point of sale	54	77	100	100
Packaged processed foods that meet nutritional criteria	50	77	100	100
Packaged processed foods that do not meet nutritional criteria	42	71	100	100
Other types of advertising at the point of sale (%)	0	14	63	36
Other types of advertising in the school (%)	33	29	0	0
Printed materials with brands	8	14	0	0
Games	4	7	0	0
Gifts	4	0	0	0
Tours to the company	21	21	0	0
Informative talks	8	14	0	0

Table 4 Percentage of schools that complied with the healthy snacking initiative, and reasons for non-compliance, by education level and type of school, in a sample of primary and secondary schools in Montevideo (Uruguay), July–November 2016

	Education level			
	Primary		Secondary	
	Public (n 24)	Private (n 14)	Public (n 8)	Private (n 13)
Compliance with the law (%)	33	29	0	0
Reasons for non-compliance (%)				
Exhibition of non-recommended foods and beverages	42	71	100	100
Advertising at the point of sale of non-recommended foods and beverages	0	0	50	15
Other types of advertising of non-recommended foods and beverages	33	29	0	0

showed a positive attitude towards it. However, the majority lacked knowledge about the specific contents of the law and its regulatory decree. As shown in Table 5, the majority of the school principals described their degree of knowledge of the content of the initiative as partial. School principals frequently stated that the initiative established that some products could not be sold in schools, but they did not refer to prohibition of advertising (and particularly exhibition of foods and beverages). In particular, 61% of school principals explicitly referred to prohibition of the sales of unhealthy foods and beverages, such as soda and salty snacks, when discussing the content of the law.

When asked about compliance, the percentage of principals who thought their school complied with the requirements of the initiative was higher than the percentage of schools that in fact complied (cf. Tables 4 and 5). As shown in Table 5, perceived compliance tended to be higher for primary schools than for secondary schools, particularly in the case of public schools.

According to the interviewees, the reason for non-compliance was selling unhealthy foods and beverages. School principals stated that although they have introduced changes in the foods and beverages sold at school, unhealthy products were still sold. The following quotes exemplify some of the responses:

'The school meets the law, but with certain limitations ... We have suggested them to sell healthier options.'

'There are still things that I do not completely agree. There are still some snacks.'

'We said that we wanted to get as close as possible to the law because it was a question of being covered and because we agree that teenagers should eat correctly. However, we leave it a bit at the discretion of the company, but they can adapt to that based on the demand.'

According to principals of public primary schools, changes in the availability of foods and beverages after the implementation of the initiative mainly related to decreasing or removing processed products and increasing the availability of homemade foods and beverages. For principals of private primary schools, as well as those from secondary schools, the people in charge of the canteens were asked to increase the offer of processed products that they inaccurately regarded as healthy, such as packaged fruit juices, breakfast cereals and jelly. In other cases, principals also indicated that they had asked canteens to reduce the availability of unhealthy processed products, especially soft drinks and candies.

Factors underlying compliance with the healthy snacking initiative were classified into three main themes: (i) characteristics of the initiative; (ii) characteristics of the school; and (iii) external factors. Table 6 shows an overview of the categories identified within each of the themes and example of quotes from school principals within each category. Results are discussed in detail below.

Characteristics of the law and its implementation

School principals stated that there had been a lack of clear communication from the authorities about the law and its characteristics, to facilitate interpretation. Most of the school principals said that they had not received any information from the authorities. Those who had received information stated that they had only received the law without any explanatory material on how to implement it (Table 6). Most school principals from primary schools said that they had received a resolution from the National Public Education Administration about the law. However, some principals from secondary private schools declared not having received the law from the authorities and having read about it in the press.

The majority of school principals recognized difficulties for identifying the products recommended by the Ministry

Table 5 Awareness, knowledge and perceived compliance with the healthy snacking initiative from the perspective of school principals, by education level and type of school, in a sample of primary and secondary schools in Montevideo (Uruguay), July–November 2016

	Education level			
	Primary		Secondary	
	Public (n 24)	Private (n 14)	Public (n 8)	Private (n 13)
Awareness of the initiative (%)	100	90	88	88
Degree of knowledge of the content of the initiative (%)				
Total	36	20	38	25
Partial	64	70	50	63
None	0	10	12	12
Perceived compliance with the initiative (%)				
Total	76	60	38	50
Partial	24	20	38	44
Does not comply	0	10	12	6
Does not know	0	10	12	0

Table 6 Emerging categories and sub-categories related to the factors underlying compliance with the healthy snacking initiative in a sample of primary and secondary schools in Montevideo (Uruguay), July–November 2016

Category	Sub-category	Examples of quotes
Characteristics of the law and its implementation	Lack of communication	'This is personal. It would be good to be informed about the law not only through the web, to receive more and training.' 'We did not receive nothing explanatory, apart from the norm itself.'
	Lack of clear guidelines	'Even with the law, sellers come and tell you "this is allowed" and you have doubts.' 'It is of special interest to be able to know what the law is about, not just from a legal perspective, let's say, but also how to apply it in our everyday reality.' 'There was a resolution that came to the school, but there was not any kind of advice to guide us. So, you have the law, but you do not know if something is included in it or not.'
	Control from the authorities	'We are controlled by the PAE [School Food Program]. They come periodically to inspect the service and they also inspect ... the food provided each day to see if it is balanced or not.' 'We have not received any inspection from the Ministry.' 'Secondary schools are not controlled. They are confident that the school has a canteen committee and that it controls.' 'There is a canteen committee that controls what it is sold in the canteen, but we know that, in general, every canteen sells candies, and there is nothing to do about it.'
	Lack of punishment	'The law exists but there is nothing that protects you. Everything depends on the agreements that the head office makes with the person in charge of the canteen. ... There are no penalties if you do not comply with the law.'
	Interest in the topic	'We have a nutrition project, and a healthy snack for the little ones.' 'We designed a project because we were worried about ... the high percentage of children with cholesterol, diabetes, heart problems, glycaemia. We started seeing limited physical aptitudes in physical education, we started seeing obesity. ... Because of that ... like six years ago we started working, even before the law. We start when they are small children with the famous healthy snacks, daily homemade snacks, fruit.'
Characteristics of the school	Characteristics of the sales of foods and beverages	'Everything we sell here is homemade, except for the biscuits.' 'They are asked to prepare homemade food, sponge cake and things like that ... and healthy ... cookies made by themselves.' 'There is a big resistance from canteen managers.'
	Availability of a place to prepare food	'It also depends on the space available in schools, for example, I cannot make neither rice with milk nor pudding here because the kitchen is too small.' 'We would like to comply with the law, but we have not the conditions to do it, like a sink.'
	External factors	Preferences Availability of unhealthy foods outside the schools Advertising Family habits

of Health (Table 6). When asked about how they knew what products they could buy, they did not explicitly refer to the nutritional composition of the products or the list of recommended packaged products that the Ministry of Health was supposed to implement. Instead, some school principals stated that they trust what food providers or canteen managers say.

Control from the authorities was perceived as a major determinant of compliance with the initiative. Principals from public primary schools that are included in the school food programme that provides lunch and snack to the students claimed to have a strict control on the foods and beverages they provide (Table 6). However, according to principals of public primary schools that are not part

of the programme, the authorities did not inspect the foods and beverages that are sold for fundraising purposes, particularly when students or parents are in charge of the activity. Similarly, principals from private schools stated that they had never received any type of control or inspection from the authorities. Although secondary public schools should have a canteen committee composed of teachers that controls what is sold in the canteens, they recognized difficulties to make this committee work and stated that they usually do not have much influence on the decisions of canteen managers (Table 6).

Finally, the lack of legal sanctions was a major barrier for compliance with the law, particularly in the case of secondary schools where outsourced third parties are in

charge of school canteens. School principals said that they found it difficult to enforce canteen managers to comply with the requirements of the law as the law does not establish any type of sanction (Table 6).

Characteristics of the schools

Several school factors strongly influenced compliance with the healthy snacking initiative. As previously discussed, compliance with the initiative was markedly larger in primary schools than in secondary schools and public primary schools were more likely to comply than private primary schools. Other school characteristics underlying compliance were interest in the topic, characteristics of the sales of foods and beverages, and availability of a place to prepare food.

During the interviews, it was possible to clearly sort school principals according to their interest in food and nutrition. Likelihood of complying with the initiative was higher when the school principals were interested in the topic. Some of these schools had even implemented actions to promote healthy eating patterns before the implementation of the national initiative given the high prevalence of overweight, obesity and other health problems among children (Table 6). On the contrary, other school principals said that eating habits were just one of the many problems they had to deal with and did not seem to invest additional time or effort to address them.

The characteristics of the sales of foods and beverages, and particularly the criteria underlying the selection of products, were a major determinant of compliance with the initiative. When school staff, parents or children were responsible for selling foods and beverages, particularly in primary schools, emphasis on homemade products was made. Nevertheless, there were no references to the ingredients or their proportions that should be used in the preparation of homemade products. On the contrary, when outsourced third parties were responsible for selling foods and beverages, demand and profit were the main criteria underlying food availability (Table 6). Interviewees pointed out that the selection of products is based on the students' preferences, regardless of their nutritional quality. In addition, homemade products were perceived as more expensive than packaged processed products (e.g. 'There are still some snacks because of the prices. Homemade food is expensive for students').

Another barrier identified in secondary public schools was the lack of an adequate place to prepare homemade food. Many canteens had only a small place that enabled them only to sell packaged products (Table 6).

External factors

According to the school principals' accounts, factors external to the schools largely influenced compliance with the initiative (Table 6). Children's and adolescents' preferences for foods and beverages were recognized as a major determinant of the type of products sold in the

schools. According to the interviews, although the initiative encourages availability of healthy foods, children and adolescents still prefer unhealthy products, which makes it difficult to convince canteen managers to change their offer of foods and beverages. In addition, in the specific case of secondary schools, school principals explained that if unhealthy foods and beverages (e.g. cookies, snacks or soda) were not sold in the canteens, students would be able to buy them in the local stores located around the schools, decreasing the profitability of school canteens. Family habits and advertising were identified as key determinants of the preference of children and adolescents (Table 6).

Strategies to promote healthy eating habits

School principals were also asked to describe the specific activities that were conducted in their school to promote healthy eating habits in children and adolescents. Table 7 shows an overview of the strategies identified in the interviews, which ranged from restrictions on the sales of foods and beverages to educational activities with children and parents.

Some schools limited the sales of specific product categories which are largely regarded as unhealthy, such as soft drinks, salty snacks and cookies (Table 7). This restriction was mainly implemented based on the characteristics and associations of the categories and not necessarily on the specific nutritional composition of the products. In the case of public primary schools where school staff were responsible for selling foods and beverages, the implementation of this strategy was based on direct selection of the products, whereas in the case of private primary schools or secondary schools it was implemented by setting specific requirements to the outsourced companies responsible for selling foods and beverages. Some primary schools went further than this and imposed restrictions on the foods and beverages consumed by children. School principals stated that they did not allow them to consume some unhealthy foods or beverages inside the school. Some of them reported removing unhealthy products from children and returning them at the end of the day (Table 7). Other primary schools controlled food and beverage consumption by providing the afternoon snack to children.

Educational activities targeted at children and parents were also a frequent strategy to encourage healthier eating patterns. These included informational talks about healthy eating and the healthy snacking initiative targeted at parents, the inclusion of food-related topics in different subjects and extracurricular activities. For example, some school principals stated that they organized cooking workshops or maintained a vegetable garden with children (Table 7). They also reported that they tried to engage parents in extracurricular activities, such as a shared notebook with recipes.

Table 7 Strategies developed in schools to promote healthy eating habits in children and adolescents in a sample of primary and secondary schools in Montevideo (Uruguay), July–November 2016

Category	Examples of quotes
Restrictions on the sales of foods and beverages	'It was decided not to sell foods and to work with the families, so that children bring healthy snacks for the breaks ... well, fruit, natural things, homemade.' 'One of the measures that we have taken is not to sell soft drinks in primary schools.'
Restrictions on food and beverage consumption	'We do not allow them to have a soda during lunch time, for instance.' '[If a child comes with a snack or an <i>alfajor</i>] what we do is to keep it in the library and we give it back when he/she leaves. We do not allow them to eat it during class time. ... When they are told to not to eat that food they can go to the lunchroom and take a fruit or bread.' 'We provide the snack at school in the morning and in the afternoon, so we know that the food we are giving them is neither ultra-processed nor any kind of food they cannot eat.'
Activities with parents	'We insist on parents' meetings, so we emphasize once and again on it, to remind them that there is a law that prohibits.' 'We brought nutritionists when we started working with everything related to the law, and we had mums who are giving talks because we know that changes in eating habits are not fast.'
Activities related to food in the classroom	'Regarding the subjects, for instance, biology is the one that works the most with that [food and nutrition], from first grade. In English I know that they talk everything about food as a way to practice vocabulary.'
Additional activities with children	'Last year, at first grade, children started working with a vegetable garden with one of the teachers.' 'One of the extracurricular workshops we have is "little chef". ... Throughout the year children from second and third grade have domestic economy ... that deals with cooking.'

Discussion

Restriction of the availability of unhealthy foods and beverages in the school setting is one of the public policies that has been suggested to promote healthy dietary patterns and prevent childhood overweight and obesity⁽¹³⁾. The present work evaluated compliance with a healthy snacking initiative, targeted at promoting healthy dietary patterns and reducing the availability of unhealthy foods and beverages in Uruguayan schools, and explored the main factors underlying compliance from the perspective of school principals.

Perception of the healthy snacking initiative and compliance with the requirements

School principals had a positive attitude towards the initiative and reported being aware of its scope and being interested in following its recommendations. Similar results have been reported by Pettigrew *et al.*^(25–27) in Australia. Therefore, results from the present work provide additional evidence that healthy eating policies in school settings are supported by school authorities, which provides support to governments pursuing the introduction of similar policies.

However, compliance with the initiative was low, particularly in schools with canteens that sold competitive foods and beverages. The main reason for non-compliance was exhibition of packaged processed products that did not comply with nutritional recommendations. Although the healthy snacking initiative aims at limiting availability of unhealthy products and encouraging consumption of healthy products, processed products with unfavourable nutrient content continue to be the most commonly sold products in most Uruguayan schools. Availability of unhealthy foods and beverages in schools has been widely reported in several countries and has been reported to be associated with unhealthy eating patterns in children^(16–18).

Low to moderate level of compliance with policies aimed at improving the nutritional quality of products sold in school canteens has also been reported in other countries^(28–31).

Barriers for compliance with the initiative

Lack of knowledge about the content of the initiative and its requirements was a major limitation for compliance. The majority of school principals were not familiar with the specific requirements of the law and its regulatory decree. In fact, perceived compliance was higher than actual compliance (cf. Tables 4 and 5), which stresses the need to increase familiarity with the initiative. In particular, school principals reported difficulties to clearly identify unhealthy products. According to their accounts, they tended to classify foods and beverages as healthy and unhealthy based on vague health associations with specific product categories; namely soda, *alfajores* and snacks were regarded as unhealthy, whereas dairy products, fruit juices, breakfast cereals and jelly were regarded as healthy. However, it is worth highlighting that most of the fruit juices, yoghurts, dairy desserts, breakfast cereals and jellies commercialized in the Uruguayan marketplace, particularly those targeted at children, have excessive content of sugar and do not comply with the nutritional criteria defined by the Ministry of Health⁽³²⁾. Confusion about the classification criteria for healthy products has also been highlighted by Ardzejewska *et al.*⁽³¹⁾ as one of the main barriers to a broader compliance with the New South Wales (Australia) 'Healthy School Canteen Strategy'.

Specific characteristics of the initiative and its implementation were also identified as barriers for compliance. First, the initiative does not foresee legal sanctions for schools or canteens that do not comply with the recommendations, which does not provide incentives to canteen managers to modify their offer of foods and beverages. Second, according to school principals of schools that do

not participate in the School Meal Program, the government has not yet implemented strict controls on the foods and beverages that are sold, exhibited or advertised. Similar results have been reported by Lucas *et al.*⁽³³⁾ when evaluating healthy eating in UK, Australia and Sweden: strong monitoring mechanisms are not applied and policies tend to lack enforceability.

The rationale underlying the sale of foods and beverages in schools was a major determinant of compliance with the initiative. When the sale of foods and beverages was organized by staff, students or their parents, likelihood of compliance was higher as the foods sold and exhibited in the schools tended to be homemade. However, when the sale of foods and beverages was performed in school canteens under the responsibility of outsourced companies, profit was the main criterion for selecting the foods and beverages sold in the schools. It has been reported that school canteens often find it easier to maximize their profit by selling high-margin processed foods and beverages with high sugar and saturated fat content⁽¹⁴⁾. However, Pettigrew *et al.*⁽²⁵⁾ reported that the 'Australian Healthy Food and Drink Policy' aimed at reducing the availability of foods high in fat, sugar and/or salt did not introduce significant changes in the profitability of school canteens between 2006 and 2008. In addition, it should be stressed that school canteens should be regarded as part of the entire school system and should not be oriented towards obtaining economic profit^(34,35).

Profitability was more important in secondary schools than in primary schools because canteens had to compete with other food outlets in the surroundings as students from third grade are allowed to go out during the breaks. For this reason, canteen managers of secondary schools are less motivated to reduce their offer of unhealthy foods and beverages as they compete with other food outlets that do not face restrictions on the foods and beverages they can sell. These differences between primary and secondary schools have already been reported by other studies^(30,35). Preferences for unhealthy products have been reported to increase with age in the USA⁽²⁹⁾, which provides further motivation for selling unhealthy products in secondary schools.

Preference for unhealthy foods and beverages seems to be a major barrier for the successful implementation of healthy snacking initiatives in the school setting, as previously reported by other authors^(29,32). Therefore, external factors that shape children's preferences and eating habits cannot be disregarded as barriers for compliance with this type of initiative. In this sense, other factors within and around the school environment should be taken into account⁽³⁶⁾.

Recommendations for implementation and accompanying policies

A series of recommendations for accompanying policies was identified to overcome the barriers for compliance

with the healthy snacking initiative in Uruguay. First, communication of the scope and contents of the law to school principals should be improved. Simple information explaining the content of the initiative and training should be implemented to ensure that school principals understand its contents and have practical information on how it should be implemented in their schools. The clarity of the information provided to stakeholders has been previously identified as one of the most important factors underlying compliance with similar policies. For example, a high level of understanding and confidence with the 'Smart Choices Healthy Food and Drink Supply Strategy' was reported in the State of Queensland (Australia), where a high level of compliance was identified⁽³⁷⁾. According to Dick *et al.*⁽³⁷⁾, most school principals and the staff in charge of the canteens had attended informative sessions. In addition, Pettigrew *et al.* reported that self-perception of compliance is related with satisfaction with the clarity of guidelines^(25–27).

A simple system to highlight the nutritional composition of products seems necessary to facilitate the identification of healthy and unhealthy foods and beverages by school principals and canteen managers. The implementation of directive and semi-directive front-of-pack nutrition labelling schemes can be useful for that purpose. Successful strategies have been reported worldwide. In 2007, Australia implemented the 'Healthy Food and Drink Policy', which featured a traffic-light system and required that foods classified as red could not be sold in the canteens and could not be distributed in class by school staff or as part of other school activities⁽²⁵⁾. More recently, Chile implemented nutritional warnings to highlight products with high content of energy, sugar, fat and sodium and established that such products could not be sold in schools⁽³⁸⁾.

Processed products are still widely available in Uruguayan schools, as the healthy snacking initiative does not introduce restrictions on the type of foods and beverages that are sold. On the contrary, natural or minimally processed products, such as fruit, nuts and water, still represent a minority of the products available for sale. Although children usually possess the knowledge to make healthy choices, they are expected to choose unhealthy products from school canteens⁽³⁹⁾. This has been related to the fact that school canteens are used as a 'treat' for children. Therefore, strict compulsory restrictions on the type of foods and beverages that can be sold in schools seem necessary to promote healthy eating patterns in children and adolescents. Strategies aimed at reducing the availability of energy-dense products with high content of sugar, fat and/or sodium have been reported to have a positive impact on the diet of children and adolescents^(40,41). However, further research on the effect of such policies on nutrient intake and obesity prevalence is still necessary.

Results from the present work also stress that incentives should be provided to school canteens to reduce the availability of unhealthy processed foods and beverages.

In this sense, the inclusion of legal sanctions for non-compliance with the requirements established in the initiative and strict governmental controls can act as incentives for canteen managers to modify their offer of foods and beverages. Previous studies have stressed that school canteens tend not to comply with nutritional guidelines when monitoring and enforcement are weak⁽²⁸⁾.

Although school canteens have a central role in the school environment, the influence of external factors should not be overlooked⁽³⁶⁾. In this sense, additional strategies to encourage healthy eating habits in children and adolescents should be implemented⁽²⁷⁾, which include nutritional education, accompanying public policies and social marketing campaigns targeted at the whole educative community⁽⁴²⁾. In the present work, school principals who had implemented additional strategies to promote healthy eating habits, such as increasing monitoring inside the schools, curricular or extracurricular activities with children, as well as activities with parents, highlighted positive results. In this sense, Lucas *et al.*⁽³³⁾ concluded that school healthy eating policies must be accompanied by comprehensive approaches which do not only point to the food provided at the centre, but also to additional food sources, such as meals brought from the home and nearest surroundings.

Conclusions

Results from the present work suggest that policies aimed at reducing the availability of unhealthy foods and beverages in the school setting are expected to be well accepted by school principals. However, compliance with the initiative was low. Barriers for compliance were related to lack of fluent and clear communication about the content of the initiative, difficulties for identifying healthy and unhealthy products, and the rationale of profit that underlies the selling of products in school canteens. In this sense, incentives should be provided to canteen managers to modify their offer of foods and beverages, which includes harsher controls and legal sanctions. However, policies aimed at modifying the food environment in schools should consider prohibiting the sale of unhealthy foods and beverages in schools in order to achieve larger effects on children's nutrient intake and conceptualization of unhealthy products.

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