

Table 1. Main goals and strategies of the intervention "Beastly Healthy at School".

<p>Main goals</p> <ul style="list-style-type: none"> – During school hours, preschoolers eat more servings of fruit and vegetables and drink more water and less sugared beverages. – Preschoolers appreciate a variety of foods from different groups of the Active Food Triangle (Flemish, VIG) using all of their senses. – Under teacher supervision preschoolers are able to examine their eating habits using the Active Food Triangle with justification of its importance. – Under supervision preschoolers can adequately handle food. – Preschoolers spontaneously apply rules of daily food hygiene. <p>Main strategies to influence the child and the different environmental factors</p> <p><i>Child</i></p> <ul style="list-style-type: none"> – Guided and self-guided activities based on experiential education (e.g. tasting) and developmental education (e.g. explanation of concepts of food triangle) – Role model, feed back and reinforcement by teachers – Educational role-model story and characters – Availability of healthy foods – Availability of cooking equipment <p><i>Parents</i></p> <ul style="list-style-type: none"> – Newsletters – Suggestions for the back and forth diary – Work sheets and creations by children – Parent evenings and other school activities with parents <p><i>Teacher</i></p> <ul style="list-style-type: none"> – Training sessions – Manual including didactic and policy aspects – Digital learning environment – Newsletters – Group discussions with teachers – Examples of good practices <p><i>School environment</i></p> <ul style="list-style-type: none"> – Newsletters – Training sessions for principals and cafeteria staff – Help on demand via e-mail – Examples of good practices – Policy aspects in the teachers' manual – Feedback to schools

used to target the intervention at the class and school level and the home environment. The main objectives were to increase the consumption of fruit, vegetables and water and to decrease the consumption of sugared milk drinks and fruit juice. A two-days training was given to the school staff. An educational package, including an educational map for the teachers, an educative story and educational material (e.g. life-size food education model based on the Flemish "Active Food Triangle") was developed. Food messages and newsletters directed at the school staff and parents were made available. An overview of the main goals and strategies are presented in table 1.

In the present paper the impact of the intervention after six months is investigated.

Methods

Sampling design

Four hundred and three schools in East Flanders were asked by mail if they would be willing to participate in an intervention study to promote healthy eating, bearing in mind that there was a 50 % chance that they would be randomised to the control group: 40 schools agreed to participate. Eight control and eight intervention schools were randomly selected, stratified on school authority, location and size of the school. For one school in the intervention group, three departments at different locations participated.

Measurements

Data was collected in both intervention and control schools at the start of the program (September 2006) and six months later (March–April 2007).

Data on available snacks and drinks during midmorning and afternoon breaks were obtained from observational recording by the teachers at the beginning of the school day or before recess, prior to any food/drink being consumed. Data on the overall food consumption pattern of the children were obtained from the parents.

In Flemish schools there is a morning and afternoon break, the so-called 'eat-drink-toilet time', during which most children consume a snack and a beverage. In most preschools the snacks and drinks are consumed together in the classroom. Most drinks are pre-ordered and delivered by the schools, while most snacks are brought from home.

All teachers of the participating schools were provided with five registration templates to register the foods the children had available for consumption during the midmorning and afternoon breaks on a daily basis and this for one school week. Written instructions and a completed example were provided. On each template the teachers had to write the names of the children in order to be able to match baseline data with follow-up data.

Further the teachers had to mark the snacks and drinks the children had available on a predefined list (For food items: fresh fruit, dried fruit, vegetables, pastry & cake, bread, breakfast cereals, yoghurt & other milk snack, nuts, crisps, sweets and other. For beverages: chocolate milk, other sugared milk beverages, regular milk, soy beverages with/without flavour, sugared soft drinks, water and other beverages). For biscuits they had to write down the type and brand of biscuits the children brought with them and for fruits they had to indicate if the children brought it from home or received it at school. If a child was absent or did not have any snacks on a day, this had to be indicated at the appropriate box.

All parents of the preschoolers within the selected schools (n = 1 432 at the beginning of the school year) were asked to

		Intervention N = 308	Control N = 168	p (chi-squared)
Gender	Boys	47	56	0.078
	Girls	53	44	
Year of birth	<2002	41	51	0.109
	2002	28	24	
	≥2003	31	26	
Education mother	Low	49	49	0.971
	Medium	34	35	
	High	16	16	
Education father	Low	60	57	0.598
	Medium	22	26	
	High	18	17	
Completed by	Mother	94	95	0.620
	Father	6	5	

Table 2. Characteristics of the sample (%; parental questionnaire).

Data of the teachers' audits are expressed in average standard portions per day except for snacks, which are expressed in the number of days a snack was consumed divided by the number of days the child was present, as no information on consumed amounts were requested.

FFQ amounts were expressed in gram per day (for foods) or millilitre per day (for beverages).

Secondary outcome variables are the (changes in) parents' opinions about the school food policy. For this outcome variable, mean scores of the food policy scales were computed. Descriptive statistics are presented for baseline and follow-up data, by condition (intervention versus control).

Linear mixed models (SPSS 15.0) were used to investigate the effect of the condition on changes in consumption and food policy aspects. For the variables of which no baseline information was available, follow-up data were compared.

Analyses of the FFQ were controlled for gender of the child and year of birth (<= 2001; 2003; >= 2004). No socio-demographic information was registered on the teachers' registration forms. *P*-values <0.05 are considered significant.

Results

Of all children approached at baseline (n = 1 432) and follow-up (1 637), respectively 884 (62 %) and 761 (46 %) returned a completed questionnaire; of whom 570 could be matched.

Only those completed by the same respondent at both measurement occasions were kept for analyses: 308 intervention children and 168 control children (Fig. 1).

Characteristics of the study sample are presented in Tab. 2. The majority (94.5 %) of the questionnaires included in the analyses was completed by the mothers of the children. The control group contained considerably (borderline significantly) more boys and children from the youngest age group.

The teachers registered data on 1 222 (85 %) children at baseline and on 1 334 (81 %) children at follow-up of which 1 063 could be matched: 618 intervention children and 445 control children. Average daily consumptions as reported by the parents at baseline are presented in Fig. 2.

Data registered by the teachers are presented in Fig. 3.

On average, children are drinking mainly water, followed by natural milk, fruit juice, sugared milk drinks and sugared soft drinks (Fig. 2). Nevertheless, during school breaks the preferred drink was fruit juice, followed by sugared milk drinks, water and natural milk (Fig. 3). Sugared soft drinks were only consumed by a minority during school breaks.

For most items the consumption at baseline was quite similar between the control and intervention group, except for milk and fresh fruit during school breaks for which a considerable lower intake in intervention children is noticed at baseline. Furthermore, the consumption of most food groups reported by the parents during the second measurement was lower than at baseline (Fig. 2).

Table 3. Estimated marginal means of the changes in consumption between baseline and follow-up by condition and parameter estimate of the intervention effect.

	Intervention		Control		Parameter estimate for intervention effect		
	Mean	SE	Mean	SE	(95% CI)	p	
Parental Reports: Average Daily Consumption							
Water (ml)	–19	12	–20	15	1	(–39–41)	0.968
Fruit juice (ml)	–29	12	–19	14	–10	(–49–29)	0.594
Sugared soft drinks (ml)	–8	5	–6	6	–2	(–17–14)	0.822
Sugared milk drinks (ml)	–22	7	–31	10	9	(–15–32)	0.458
Milk (ml)	–23	9	0	12	–23	(–51–5)	0.106
Fresh fruit (g)	6	3	–4	4	9	(0–18)	0.039
Snacks (g)	–2	2	–2	3	–1	(–9–7)	0.819
Vegetables (g)	–1	2	–4	3	3	(–5–11)	0.485
Teachers' Audit: Portions per Day during Breaks							
Water (ml)	0.08	0.06	0.03	0.07	0.05	(–0.14–0.23)	0.581
Fruit juice (ml)	–0.05	0.05	–0.09	0.06	0.04	(–0.13–0.20)	0.629
Sugared milk drinks (ml)	–0.07	0.05	0.00	0.06	–0.07	(–0.23–0.09)	0.391
Milk (ml)	0.00	0.01	0.00	0.02	0.01	(–0.04–0.05)	0.841
Fresh fruit (g)	0.14	0.04	0.04	0.05	0.09	(–0.04–0.23)	0.161
Snacks (g)	–0.07	0.03	–0.09	0.03	0.02	(–0.07–0.11)	0.621

The models were adjusted for age and gender

Table 4. Means (SE) at baseline (T1) and follow-up (T2) by condition and parameter estimate (95% CI) of the intervention effect and significance of the effect.

		Intervention		Control		Parameter estimate intervention effect		
		Mean	SE	Mean	SE	B	95 %CI	p
opinions about school food policy in general	T1	4.09	0.02	4.09	0.04	0.06	(–0.01–0.13)	0.090
	T2	4.11	0.02	4.04	0.03			
opinions about restrictions	T1	3.32	0.04	3.51	0.06	0.04	(–0.10–0.17)	0.585
	T2	3.29	0.05	3.46	0.07			
being informed about school food policy	T1	3.77	0.04	3.60	0.07	0.07	(–0.24–0.38)	0.591
	T2	3.96	0.04	3.76	0.06			
satisfaction with school food policy of child's school	T1	3.81	0.04	3.69	0.05	0.17	(–0.09–0.42)	0.159
	T2	3.94	0.04	3.69	0.06			
child asking for healthy food	T2	2.62	0.04	2.44	0.05	0.15	(–0.07–0.38)	0.160
food related actions at/from school	T2	3.20	0.03	2.86	0.05	0.29	(0.08–0.51)	0.011

tion schools increased their consumption in comparison with control children with 9.2 gram/d (95 % CI: 0.4–18.0). A comparable but non significant effect (0.094 portions (95 % CI: –0.042–0.230), or 0.094*120 gram per portion = 11.3 gram) was noticed for fruit consumed during morning and afternoon breaks at school, suggesting that the effect was mainly due to changes in fruit consumed at school. Moreover, our results indicate that this increase in fruit intake at school was primarily due to fruit made available in intervention schools, suggesting that mainly the practical approach, i.e. simply providing

nutritious foods directly to young children caused changes in intake. The latter has already been shown an effective mean of promoting a healthier diet in the study of Fogarty et al.¹¹ In addition many parents (79 %) indicated at baseline that it would be an advantage if a piece of fruit could be obtained at school on a daily basis (unpublished data). Despite the positive effect of the intervention on the children's fruit consumption, no decrease in snack consumption was noticed. However snacks are mainly provided by the home environment and pursuing dietary changes in the