

Do school break-time policies influence child dental health and snacking behaviours?

An evaluation of a primary school programme

R. Freeman¹ and M. Oliver²

VERIFIABLE CPD PAPER

IN BRIEF

- Examines the effectiveness of break-time policies to promote child dental health and healthier snacking behaviours.
- Details the importance of the outside school environment as a source of sugar-containing foods and drinks.
- Points to the futility of dietary interventions based solely within schools and the need for break-time policies to be incorporated into community-based health promotion activities.

Objective The aim of the two-year controlled trial was to evaluate the effectiveness of the 'Boosting Better Breaks' (BBB) break-time policy to reduce obvious decay experience and sugar snacking in a cohort of nine-year-old children attending intervention and control primary schools. **Study design** A matched controlled prospective trial design. **Participants** Children in Year 5 were invited with their parents/guardians to take part. The children were assessed at baseline and at 24-month follow-up. One hundred and eighty-nine children attended intervention schools and 175 attended control schools which were matched for socio-economic status (SES), school location and co-education status. **Method** The outcome variables were obvious decay experience and evidence of sugar snacks found in the children's rubbish bags. All children were asked to complete a questionnaire and keep evidence of the snacks they consumed starting from school-time break to when they retired for bed in a numbered and coded 'rubbish bag' on a specific collection day at baseline and 24-month follow-up. All children had a dental examination at baseline and 24-month follow-up. **Results** Sixty percent of children at baseline and all of the children at follow-up had at least one sugar snack in their rubbish bag. The most popular snacks at follow-up were sweets, chocolate, crisps and carbonated drinks. In the school environment children attending BBB policy schools had significantly lower mean scores for sugar snacks scores at baseline but equivalent mean sugar snacks scores at follow-up compared with children attending control schools. In the outside school environment there was no effect of school intervention on sugar snack scores. Decay into dentine at follow-up was predicted by school intervention status and evidence of sugar snacks consumption outside school and at home. **Conclusions** The BBB break-time policy did not achieve its health promotion goals of promoting child dental health or encouraging children to adopt healthier dietary habits in school or in the wider environment in which they lived.

INTRODUCTION

Dental caries is a condition that is widespread throughout the world, affecting between 60% and 90% of school children worldwide. It tends to be higher in those living in areas of high social disadvantage and deprivation¹ and in countries undergoing what Moynihan and Petersen² describe as 'nutrition transition'. As is well known, dental caries is caused by high frequent consumption of foods and

drinks containing non-milk extrinsic sugars (NMES) but more recently the spotlight has rested upon the ingestion of sugar-sweetened soft drinks and energy-dense, micronutrient-poor snacks. The focus upon sugar-sweetened soft drinks and energy-dense, micronutrient-poor snacks is related to the World Health Organization concerns about the increase in global obesity.³ WHO has emphasized that the way to tackle the growing global obesity epidemic is to encourage people to limit their sugar intake to no more than 10% of their diet, which is commensurate with caries prevention. The importance of tackling the increased consumption of these foods and drinks was more alarming since:

'the high and increasing consumption of sugars-sweetened soft drinks by children in many countries is of serious concern.

It has been estimated that each additional can or glass of sugars-sweetened drink that they consume every day increases the risk of becoming obese by 60%.³

The Government's need to reduce the year-on-year rise in childhood obesity resulted in a number of healthy eating action plans which include the 'Healthy Start',⁴ the 'Healthy Schools Programme'⁵ and the 'Healthy Living Blueprint for Schools'.⁶ The aim of the school-based programmes was to enable the integration of healthy lifestyle and food messages into the school environment. School tuck shops and vending machines selling sweetened soft drinks and snacks high in sugars, fats and salt would be encouraged to provide a healthier food choice while in the classroom information about food and its production would be incorporated

¹Dental Health Services Research Unit, University of Dundee, Mackenzie Building, Kirsty Semple Way, Dundee, DD2 4BF; ²Armagh and Dungannon Health and Social Services Trust, Armagh, BT61 7NQ

*Correspondence to: Professor Ruth Freeman
Tel: +44 (0) 1382 420058; Fax: +44 (0) 1382 420051
Email: r.e.freeman@cpse.dundee.ac.uk

Refereed Paper

Accepted 6 February 2009

DOI: 10.1038/sj.bdj.2009.518

©British Dental Journal 2009; 206: 619–625

into teaching programmes. Furthermore, participation in the 'Health schools programme'⁵ and 'Healthy living blueprint for schools'⁶ would not only promote healthy eating but would have the additional effect of preventing dental caries.⁷

In Northern Ireland similar arguments were being voiced in the mid-1990s. Disturbed by the high prevalence of dental caries in primary school-aged children in Northern Ireland, Oliver developed a school-based policy called 'Boosting Better Breaks' (BBB) to counteract the effects of energy-dense but nutritionally poor snacks.⁸ Adopting a community capacity approach Oliver negotiated with all stakeholders to ensure that principal teachers, class teachers, parents, wholesalers and providers of milk, fruit and vegetables developed partnerships to support the break-time policy.⁹ The BBB break-time policy includes the introduction of school milk, water and fresh fruit at school break-times, the closing of tuck shops and the assurance from teachers that confectionery, cakes, biscuits or sugar-sweetened soft drinks will not be given as rewards or prizes. Quality control measures are in place to ensure that tuck shops are closed, that teachers do not give confectionery etc as rewards or prizes and that children are provided with milk/water, fruit and/or vegetables at break-time. In essence the BBB schools embraced some features of the Health Promoting School.^{10,11} It was hoped that promoting child dental health through the vehicle of healthier dietary (snacking) habits in both the school and the wider environment would encourage the adoption of healthier lifestyles for the child and family. The BBB break-time policy dietary goals were to:

- Promote the child's consumption of fruit and milk during break-time in schools
- Encourage the child's adoption of healthier dietary (snacking) habits as an integral part of a healthy lifestyle for the child, their parents and family
- Enable schools to develop and incorporate the BBB strategy into their overall healthy policies – such as, for example, the closure of 'tuck shops' and the end of the use of confectionery as rewards for school achievements.

By 1999, 35% of primary schools within the Southern Health and Social Services

Board area were classified as BBB schools; however there had been no formal evaluation of the policy with regard to its primary aim to promote dental health by supporting healthier dietary (snacking) habits both within the child's school and wider environment. It seemed appropriate to investigate the effectiveness of the BBB break-time policy with regard to the reduction of obvious decay experience and the consumption of sweetened soft drinks and energy-dense, micronutrient-poor rubbish bag snacks (sugar snacks) in a cohort of children attending intervention BBB schools and non-intervention BBB (control) schools. The aim of the two-year controlled trial was to evaluate the effectiveness of the BBB break-time policy to reduce obvious decay experience and sugar snacking in a cohort of nine-year-old children attending intervention and control primary schools.

METHOD

Experimental design

A matched controlled prospective trial design was used to assess the effects of the school break-time policy upon the participants' obvious decay experience and evidence of NMES-containing snacks.

The sample

[a] The schools

The Southern Health and Social Services Board (SHSSB) is a rural part of Northern Ireland. The majority of schools tend to be isolated from one another and are in small towns (urban), villages or townlands (rural). All 235 primary schools in the SHSSB region were classified by consistent and current BBB participation, location (urban/rural) and socio-economic status (SES). All primary schools were co-educational.

The Northern Ireland Department of Education¹² uses free school meal (FSMs) entitlement (an aggregate-level measure of relative poverty, low-income and social disadvantage/deprivation) as an indicator of socio-economic status in Northern Ireland.¹² Hence the protocol used to determine SES was the percentage of children within the school entitled to FSMs. Currently, 25% of all primary school children in Northern Ireland are in receipt

of FSMs and this reflects the proportion of children who live on or below the poverty line.¹² The proportion of children in the school taking FSMs was used as an aggregate-level indicator of low-income households and child socio-economic status. Thus higher SES schools were classified as having 15% or fewer children obtaining FSMs whereas lower SES schools had greater than 40% of children obtaining FSMs.

All primary schools were subsequently matched for consistent and current BBB participation, for SES and location of school. Two schools were then randomly selected from each of the eight primary school categories:

1. Consistent and current BBB participation: high/middle SES: urban
2. Non-BBB participation: high/middle SES: urban
3. Consistent and current BBB participation: low SES: urban
4. Non-BBB participation: low SES: urban
5. Consistent and current BBB participation: high/middle SES: rural
6. Non-BBB participation: high/middle SES: rural
7. Consistent and current BBB participation: low SES: rural
8. Non-BBB participation: low SES: rural.

As the two groups (intervention [consistent and current BBB participation] *vs* control [no previous participation in BBB]) could not be randomly assigned, the experimental design attempted to control for as many contributing factors (SES, school location and co-educational status) which might affect the acquisition of health. Block randomization was used to minimize the differences and ensure that the two study groups were balanced within each strata.¹³

[b] The population sample

Children in Year 5 and their ninth year of life were invited with their parents/guardians to take part. The children were followed longitudinally from Year 5 to Year 7 in order to evaluate the effectiveness of the break-time policy to reduce obvious decay experience and evidence of consuming sugar snacks. A sample size of 169 in each of the groups was required to have a power of 80% to detect a difference in mean D_{3cv} MFT of 0.75

(2.45–1.70) assuming a standard deviation of 2.45 using a two sided t-test with 0.05 significance level.

Child questionnaire

The children were administered a questionnaire which inquired of their knowledge of healthy and unhealthy snacks and a check-list to identify the type of snacks they reportedly consumed during different times of the day. In addition they were asked if they visited any shops (for example, corner shops) on the way to and/or on the way home from school. The children's knowledge of healthy and unhealthy snacks together with their reported snack consumption is reported elsewhere.¹⁴

The rubbish bag method of assessing sugar snack consumption

At baseline and at 24-month follow-up, evidence of the children's sugar snacks was assessed using the 'rubbish bag method'. The rubbish bag collection period started with morning school-break and finished with the child retiring to bed.

The rubbish bag method used was based on Rathje's 'Garbage Project'.¹⁵ This archaeological approach was adopted because the 'studying [of] consumer behaviours directly from the material realities they leave behind rather than from self-conscious self-reports' provides a more accurate measure of consumption as 'what people say they do and what they actually do are often different'.¹⁵ Rathje's¹⁵ conjecture reflected the findings of Freeman and Bunting¹⁶ and Bunting and Freeman¹⁷ in their previous assessments of children's food consumption. They found that what the children professed to consume bore little relationship to what they actually ate. Hence the collection of rubbish seemed appropriate in this context to assess the relationship between sugar snacks and obvious decay experience. However whereas the Garbage Project¹⁵ had used 'fresh refuse' to examine the relationship between fluoride and tooth decay, the rubbish bag method collected chocolate/biscuit wrappers, crisp packets, fizzy drinks cans, milk cartons, orange peel, apple cores – in short, anything that provided evidence of the snacks the children had taken during school, outside school and at home on the rubbish bag day collection. In addition

to sugar snacks a note was made of all other snacks found in the bags including the number of packets of crisps which is reported upon here.

The 'rubbish bags' were 30 cm × 20 cm transparent polythene food bags. All participating children were asked to put the remains of their snacks they consumed in a code-numbered and dated polythene bag. If a child had an unwrapped biscuit or sandwich the teacher or parent was requested to write a description of the snack on a piece of paper and place it in the child's 'rubbish bag'. All collections of the rubbish took place concurrently. The children were blind as to the reason they were being asked to take part in order to reduce any bias. The 'rubbish bags' were collected by members of the research team other than GB. It was subsequently analysed by GB, who was thus unable to identify if the bags were collected in intervention/control schools.

In order to compare the evidence of energy-dense, nutrition-poor snacks, a total score for sugar snacks within the rubbish bag was calculated for each child. Each time the evidence of a sugar snack was noted in a rubbish bag a score of 1 was awarded. All evidence of sugar snacks (for example cakes, biscuits, sweetened soft drinks, chocolate, sweets) were identified. A score for the individual items were summed together to give a total sugar snack score at school and outside the school environment for baseline and 24-month follow-up. All items were summed to give a total daily sugar snacking score at baseline and 24-month follow-up for the assessment period.

Clinical examination: the assessment of obvious decay experience

Obvious decay experience (D_{3cv} MFT) was assessed using the British Association for the Study of Community Dentistry¹⁷ guidelines standardised for the collection of epidemiological data throughout the UK. The protocol used recognises cavitation and visual dentine caries (D_{3cv}) on the basis of a clinical examination conducted without the use of probes. The full examination was conducted under standardised conditions observing normal infection control protocols. A single, independent, BASCD calibrated community dentist (JK) examined all children taking part in the study. JK and

her scribe (the dental nurse) were blind with regard to the BBB participation status of the school(s). All dental examinations took place at the same time of the year.

Intra-examiner reliability was measured by re-examining a 10% random sample of all children (two week interval). Two dental examinations were conducted for each of the selected children at baseline. An identical format to assess intra-examiner reliability was used at the 24-month follow-up. The Kappa statistic was used to give an accurate measure of intra-examiner reproducibility. The intra-examiner reliability was high with 100% agreement at baseline and 24-month follow-up.

Statistical analysis

The statistical analysis included chi-square analysis, t-tests, repeated measures analysis of variance and hierarchical regression analysis. A repeated measures fixed effects ANOVA with two levels for each factor including a within-subject factor of time with two levels (that is, baseline and 'follow-up') was adopted to test for the effects of the independent variables – school intervention status, SES and time – upon the dependent variables: evidence of NMES-containing snack consumption scores and obvious decay experience. Hierarchical multiple regression was adopted to explain the variance in D_{3cv} MFT and D_{3cv} .

RESULTS

The sample

Three hundred and sixty-four children were invited to participate (Fig. 1) – 189 children in the BBB participating schools and 175 children in the control schools. Three hundred and forty-five children took part at baseline giving a response rate of 95%. This fell to 304 children (83%) at the 24-month follow-up. A drop-out analysis showed that 13% (23) of children attending BBB participating schools and 11% (18) of children attending control schools who took part at baseline did not consent to the 24-month follow-up ($\chi^2[1] = 0.41$; $p = 0.52$). There was no significant difference in the proportion of children who did or did not return their rubbish bags with regard to school intervention status ($\chi^2[1] = 0.39$; $p = 0.54$) or socio-economic status ($\chi^2[1] = 0.41$; $p = 0.84$). Fifty-six percent of the children (96) excluded

from the final analysis due to missing data attended BBB schools and 58% (102) attended control schools ($\chi^2[1] = 0.03$; $p = 0.86$). One hundred and forty-seven complete data sets were used in the statistical analysis (Fig. 1).

Rubbish bag snacks at baseline and 24 month follow-up

Sixty percent (88) of children, at baseline, had at least one sugar snack in their rubbish bag with the number of snacks ranging between 0 and 5. At the 24-month follow-up all of the 147 children had evidence of at least four different types of sugar snack, the number of snacks ranging from between four and 11 within the assessment period (Fig. 2).

At baseline 47% (69) of the children visited a shop either on the way to school (7), on the way home from school (34) or both on the way to and from school (28). Two years later 63% (92) of the children visited a shop either on the way to school (12), on the way home from school (32) or both on the way to and from school (48). Table 1 shows the relationship between snacks in rubbish bags and shop visits. For each of type of snack there was a greater frequency found in the rubbish bags at 24-month follow-up compared with baseline in those children who visited the shop on the way home from school.

The types and distribution of snacks consumed by children at baseline and 24-month follow-up are presented in Table 2. The rubbish bags from children attending BBB policy schools at baseline consisted of milk and fruit whereas those from control schools contained chocolate and crisps. At the 24-month follow-up both children from intervention and control schools were eating a variety of snacks – the most popular being chocolate, crisps and sugar-containing carbonated drinks. All children both at baseline and at 24-month follow-up in the outside school environment consumed confectionery, chocolate, crisps, sugar-carbonated drinks and fruit.

In the school environment, children attending BBB policy schools compared with children attending control schools had significantly lower mean sugar snack scores at baseline but equivalent scores at 24-month follow-up. In the outside school environment, however, there was no effect of school intervention status on the children's

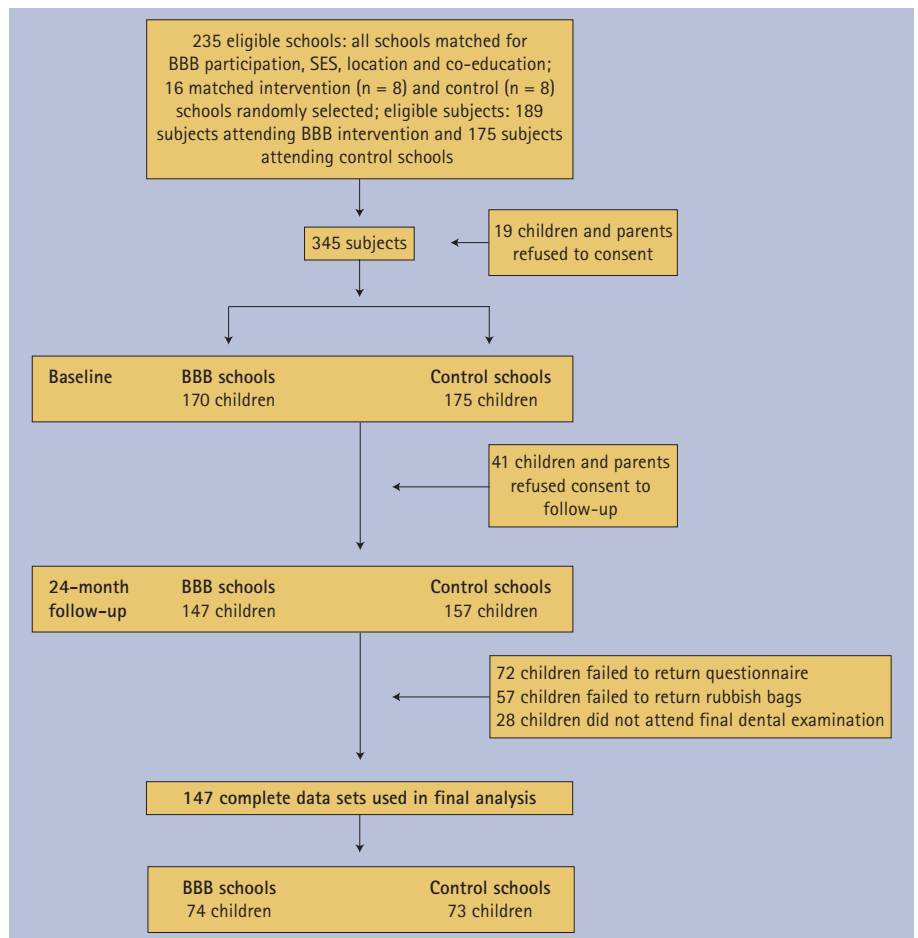


Fig. 1 Profile of BBB evaluation

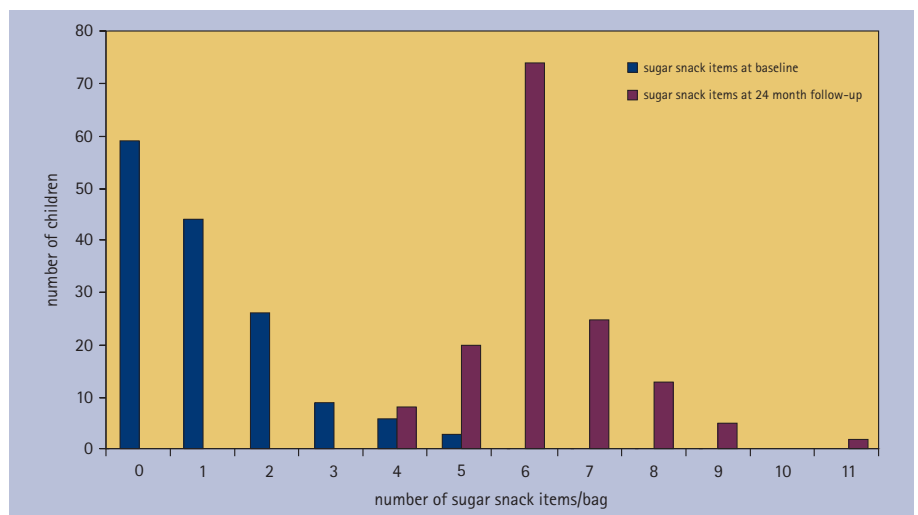


Fig. 2 Number of sugar snack items per rubbish bag by year of study

mean sugar snack scores at baseline and the 24-month follow-up (Table 3).

The assessment of obvious decay experience

[1] D_{3cv} MFT at baseline and 24-month follow-up

Thirty-six percent (53) of children had obvious decay experience at baseline whereas

at 24-month follow-up the proportion of children affected had risen to 56% (82). Significantly greater mean numbers of teeth had obvious decay experience at 24-month follow-up (1.49; 95%CI: 1.20, 1.78) compared with baseline (0.78; 95%CI: 0.58, 0.98) ($t = 7.32$; $p < 0.001$). There was no effect of the school intervention status when controlling for baseline level and socio-economic effects for obvious decay experience.

Table 1 Snacks* in rubbish bags by shop visit at baseline and 24-month follow-up

Snacks in rubbish bags	Shop not visited on the way to school		Shop visited on the way to school		Shop visited on the way back from school		Shop not visited on the way home from school	
	Baseline	24-month follow-up	Baseline	24-month follow-up	Baseline	24-month follow-up	Baseline	24-month follow-up
Confectionery	2	3	2	2	18	33	16	15
Chocolate bars and biscuits	11	8	14	12	14	43	25	24
Crisps	22	13	21	26	34	42	23	26
Sugar carbonated drinks	3	0	1	2	6	24	12	9

*The term 'snacks' relates to the wrappers, empty crisp packets, bottles etc found within the rubbish bags

[2] Decay into dentine (D_{3cv}) at baseline and 24-month follow-up

The number of teeth with D_{3cv} (operationalised by cavitation and decay into dentine on examination) ranged from 1 to 5 at baseline and from 1 to 7 at the 24-month follow-up. The mean score for D_{3cv} at baseline was 0.25 (95%CI: 0.13, 0.37) and was 0.39 (95%CI: 0.22, 0.55) at 24-month follow-up.

[3] Predicting D_{3cv} at 24-month follow-up

Hierarchical multiple regression was adopted to explain the variance in D_{3cv} . The independent variables were introduced in two blocks. The first block consisted of baseline D_{3cv} , together with school intervention status and SES. These variables acted as controls to remove any associated variance. School intervention status and SES were defined by two dummy variables with the BBB intervention status and middle SES acting as baseline. The second and final block was introduced to test for the remaining effect of the evidence of sugar snack consumption outside of school and at home once all other variables had been controlled for.

Decay into dentine at 24-month follow-up was predicted by attendance at an intervention school and evidence of sugar snack consumption outside school and in the home environment. The complete model explained over 18% of the variance of decay into dentine in the children studied (Table 4).

DISCUSSION

The aim of this investigation was to evaluate the effectiveness of the BBB break-time policy to reduce obvious decay experience and sugar snacking in a cohort of nine-year-old children attending

Table 2 Intervention and control school children's sugar snacks at baseline and 24-month follow-up

At school	Children attending BBB schools (n = 74)		Children attending control schools (n = 73)	
	Number of rubbish bags		Number of rubbish bags	
Type of snack	Baseline	24-month follow-up	Baseline	24-month follow-up
BBB permitted snack				
Milk	17	8	16	11
Fruit	25	4	9	13
Other snacks				
Confectionery	0	3	4	2
Chocolate biscuits/bars	0	6	25	14
Cakes	0	2	0	0
Crisps	0	4	43	35
Sugar carbonated drinks	0	1	4	1
Diet carbonated drinks	0	9	6	4
Bottled water	0	0	2	0
Number of empty bags	30	21	26	8
Outside of school and at home				
Children attending BBB schools (n = 74)		Children attending control schools (n = 73)		
Number of rubbish bags		Number of rubbish bags		
Type of snack	Baseline	24-month follow-up	Baseline	24-month follow-up
BBB permitted snack				
Fruit	3	17	6	23
Milk	0	3	0	2
Other snacks				
Confectionery	11	22	23	26
Chocolate biscuits/bars	20	30	19	37
Cakes	4	5	0	6
Iced lolly/ice cream	3	6	6	10
Crisps	26	30	31	38
Pot noodle	0	2	0	3
Yogurt	7	6	4	12
Sugar carbonated drinks	11	14	4	1
Diet carbonated drinks	1	5	6	4
Bottled water	3	1	0	1
Number of empty bags	0	0	0	0

Table 3 Total scores for sugar snacks by year and school intervention status

At school	Mean scores	95%CI	F (df)	p
Total mean sugar snacks score:				
BBB at baseline (n = 74)	0.006	-0.12, 0.13	14.36 (1,145)	<0.001
BBB at 24-month follow-up (n = 74)	0.24	0.11, 0.38		
Control at baseline (n = 73)	0.57	0.44, 0.70		
Control at 24-month follow-up (n = 73)	0.29	0.15, 0.43		
Outside school and at home				
Mean scores	95%CI	F (df)	p†	
Total mean sugar snacks score:				
BBB at baseline (n = 74)	0.81	0.56, 1.11	0.76 (1,145)	0.76
BBB at 24-month follow-up (n = 74)	6.03	5.80, 6.25		
Control at baseline (n = 73)	0.83	0.59, 1.07		
Control at 24-month follow-up (n = 73)	5.99	5.76, 6.21		

Table 4 Multiple linear regression summary results of predicting decay into dentine at 24-month follow-up

Constant	B	se	t	p	ΔF	Δp
	0.33†	0.32	1.03	0.30		
MODEL 1:					7.95	<0.001
Intervention status of school ^a	-0.31	0.15	-2.00	<0.05		
Baseline D _{3cv}	0.49	0.11	4.60	<.001		
MODEL 2:					6.10	0.02
Sugar snacking outside school and at home ^b	0.19	0.76	2.47	0.02		

R Square = 0.18, F(4,142) = 7.70, p < 0.001

†Only significant values presented in Table 3

a: 0 = BBB intervention school, 1 = control school

b: High scores denotes greater evidence of NMES at home (at baseline and at 24-month)

intervention and control primary schools. With regard to both of the outcome measures the break-time policy failed.

Children who attended the intervention schools at baseline had evidence of consuming fewer sugar snacks in the school environment compared with those who attended control schools. In this regard, there was some evidence of success. However, when the 24-month data was carefully examined it became clear that irrespective of school intervention status, all of the children had between four and 11 sugar snacks in their rubbish bags. While there was evidence of more sugar snacks within the BBB school environment, the largest increase at 24-month follow-up was noted in the outside school environment and at home for all of the participating children. This shift in snacking reflected the increased shop visiting undertaken by

children as well as the increased numbers of wrappers of confectionery, chocolate and biscuits, packets of crisps and tins of fizzy drinks found in their rubbish bags at 24-month follow-up compared with baseline.

This change in dietary behaviour was supported by the qualitative work conducted to explore parental attitudes between meal snacking and the BBB break-time policy.¹⁹ The underlying attitude which pervaded the parents' view of sugar snacking was the wish to 'do best' for their children. For some parents this required a strict form of regulation of between meal snacks whereas for others the buying of sweets, chocolate and biscuits was an expression of affection and a means of ensuring the children 'ate at least something'. With the onset of adolescence parents commented on the change

they had noted in their children regarding their child's 'greediness' for sweets, chocolate and biscuits. Parents spoke of their difficulties in controlling their pre-adolescent children's continuous snacking while others talked of their children's insatiable appetite and of 'being unable to fill the child'.¹⁹

With the shift in psychological development from latency to pre-adolescence,²⁰ the increased evidence of sugar snacking and visits to corner shops, it should have been of little surprise that there were also significant increases in obvious decay experience between baseline and follow-up. Nevertheless, the disappointing finding that it was children attending intervention schools who experienced the greatest increase in decay into dentine raised the concern that this break-time policy had exacerbated dental disease. The finding that decay into dentine at follow-up was explained by sugar snacks in the out of school environment supports the view that school break-time policies on their own, which restrict children's choices of foods and drinks, may be detrimental to health.²¹ As unpalatable as this supposition may be, there is a need to consider the effect of restricting children's food choices without providing and incorporating contemporaneous health education (including the promotion of fluoride toothpaste use) into teaching programmes as well as developing and encouraging children's experiences of healthier snack choices.^{5,6} Furthermore, the introduction of fluoride milk could have been of value in solving the considerable dental health problems of the participating children. Hence the lack of health education specifically tailored for the BBB break-time policy and the reduced awareness of the changes in food patterns in adolescence^{19,20} must be acknowledged as limitations of the BBB health promotion intervention.

Concerns have been voiced with regard to the choice of design to evaluate health promotion programmes.²¹⁻²⁴ In general, prospective trials are difficult to undertake due to the relatively high drop-out rate – as experienced in this study. However, the work presented here was part of a larger evaluation which used qualitative¹⁹ as well as quantitative methodologies to evaluate the effectiveness of the BBB break-time policy. The study design allowed the 'does

it work?'²⁴ question to be answered and the use of qualitative research allowed an in-depth examination of why the break-time policy failed to promote child dental health and to encourage healthier eating in this cohort of children.

There are limitations of this evaluation which may be related to the reliability and validity of the two outcome measures used. The use of obvious decay experience has been questioned as being objective and sensitive enough to detect caries activity as an outcome measure.²⁵ It was perhaps not possible to expect improvements in obvious decay experience within a two-year period but nevertheless this period of time was not too short to show deterioration in dental health. The use of the 'rubbish bag' as evidence of snack consumption may be flawed since the children may or may not have put some or all of their snack wrappers into their rubbish bags. However, alternative self-report assessments are also fraught with inaccuracies since, to quote Rathje,¹⁵ 'what people say they do and what they actually do are often different'. There are weaknesses in both methods of assessing dietary habits, and the authors of this paper support Rathje's¹⁵ view that the archaeology of rubbish provides a way of 'studying [child] consumer behaviours directly'. Therefore despite these methodological concerns, the present finding – that the children's sugar snack scores were predictive of decay into dentine – suggested that an examination of rubbish bag contents provided an apt means of assessing sugar snacking.

In conclusion, the findings were disappointing. The BBB break-time policy was not able to achieve its health promotion goals of promoting child dental health or encouraging children to adopt healthier dietary habits in their school or in the wider environment in which they lived.

This research project was funded by the NHS R&D Programme Primary Dental Care: grant number RDO/90/07. The views and opinions expressed in this paper do not necessarily reflect those of the DoH UK. We would also like to acknowledge the assistance of Grace Bunting and Julia Kirk with the data collection.

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