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## Evaluation of implementation and effect of primary school based intervention to reduce risk factors for obesity

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### Abstract

**Objectives** To implement a school based health promotion programme aimed at reducing risk factors for obesity and to evaluate the implementation process and its effect on the school.

**Design** Data from 10 schools participating in a group randomised controlled crossover trial were pooled and analysed.

**Setting** 10 primary schools in Leeds.

**Participants** 634 children (350 boys and 284 girls) aged 7-11 years.

**Main outcome measures** Response rates to questionnaires, teachers' evaluation of training and input, success of school action plans, content of school meals, and children's knowledge of healthy living and self reported behaviour.

**Results** All 10 schools participated throughout the study. 76 (89%) of the action points determined by schools in their school action plans were achieved, along with positive changes in school meals. A high level of support for nutrition education and promotion of physical activity was expressed by both teachers and parents. 410 (64%) parents responded to the questionnaire concerning changes they would like to see implemented in school. 19 out of 20 teachers attended the training, and all reported satisfaction with the training, resources, and support. Intervention children showed a higher score for knowledge, attitudes, and self reported behaviour for healthy eating and physical activity.

**Conclusion** This programme was successfully implemented and produced changes at school level that tackled risk factors for obesity.

### Introduction

The prevalence of childhood obesity is increasing throughout the world.<sup>1</sup> Within the United Kingdom, estimates of obesity range from 6% in preschool children<sup>2</sup> to 17% by age 15.<sup>3-4</sup> Because obesity may track into adulthood<sup>5</sup> and adult obesity is difficult to treat, prevention strategies are best targeted at children.<sup>4-6-7</sup>

Most obesity interventions have taken place in clinical settings. However, schools also provide an opportunity for preventing and treating obesity.<sup>4-8-9</sup> Most school based approaches have targeted obese children, with most success in primary school aged

children.<sup>10</sup> An alternative strategy is to implement a primary intervention health promotion programme aimed at all pupils. Again, these initiatives have had some success in the United States,<sup>8</sup> although more specific interventions targeted at the different factors influencing children's eating and physical activity behaviours (classroom education, food service, parents) may be needed.<sup>9</sup>

Despite major resources being deployed towards encouraging health promotion in schools in the United Kingdom, no rigorously designed intervention studies of programmes targeting obesity have taken place.<sup>11</sup> Health promotion programmes are unlikely to be successful if the programme is of poor quality or has not been efficiently implemented.<sup>12</sup> This paper describes and evaluates the implementation of a health promotion programme in primary schools to prevent risk factors for obesity. The outcome measures relating to weight, diet, and activity, which we evaluated by a randomised controlled trial, are reported separately.<sup>13</sup>

### Participants and methods

#### Intervention programme

The active programme promoting lifestyle education in school (APPLES) was designed as a multidisciplinary, multiagency programme using a population approach that was underpinned by the Health Promoting Schools philosophy.<sup>14</sup> This philosophy aims to link the school with family and community and focuses on the whole school ethos, including its policies, management style, and attitudes of staff, so that consistent health messages are given and received.

The programme's team included a dietitian (project manager), a community paediatrician, a health promotion specialist, a psychologist, an obesity physician, and a nutritional epidemiologist. The programme targeted the whole school community including parents, teachers, catering staff, and the school environment. It was designed to take place over one academic year and was based on the concept of school action plans, which were to be developed by the individual schools on the basis of their perceived needs. The programme was intended to influence dietary and physical activity behaviour and not simply knowledge in the school children.

The team provided training for teachers and some resources, and the project manager also provided input and contacted the schools regularly throughout

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the year to give support. The underlying approach was to be non-prescriptive and to ensure ownership of the programme by the schools.

### Participants

Ten state primary schools in Leeds were enrolled into the project as described in the accompanying article.<sup>13</sup> Sociodemographic measures suggested that they were somewhat advantaged schools, with 1-42% of children from ethnic minorities and 7-29% entitled to free school meals (compared with 11% and 25% for Leeds children as a whole).

Children in years 4 and 5 (8-10 year olds) received the programme. This age group was chosen because the prevalence of overweight increases at around this age, the children were able to cooperate with questionnaires, and collection of data could be completed before they left primary school.

In 1996, the schools were randomised to receive the programme or serve as controls for that year. The five control schools received the intervention the following year. To evaluate the implementation and effect of the programme, we pooled data from the 10 schools.

### Design and development of intervention

To inform the design and development of the intervention, questionnaires were administered to all school staff, including secretarial and catering staff, and parents of year 4 and 5 pupils. The questionnaire asked for views about the importance of education on nutrition and physical activity and whose responsibility that should be. In addition, parents were asked about changes they would like to see in school and information they would like to receive. The responses

from these questionnaires were used by schools to develop the school action plans. The progress towards these targets was monitored by regular staff meetings and surveys of packed lunches, breaktime snacks, and playground activities

Response rates to these questionnaires were taken to reflect the support of parents and teachers for the programme. We also used the completion of diaries by children as a measure of commitment by children and parents, and data on growth and 24 hour recall of diet and activity questionnaires as a measure of commitment by the schools.

Changes regarding school meals were discussed with the local education authority catering organisation, which agreed that the team would work directly with the catering staff in schools. Meals were monitored by discussions with staff, collection of monthly menus, and observation of lunches on offer. We assessed whether quality had improved over the year.

An anonymous questionnaire was administered to teachers at the end of the intervention to evaluate the quality of the teachers' training, the usefulness and appropriateness of the resources, and the adequacy of support offered and to ascertain whether the programme had had an effect in the schools. We also collected information on support taken up by the schools over the year.

### Focus groups

To determine the effect on children's levels of knowledge and attitudes towards healthy living, we held focus groups in schools at the end of the first year. Details are available in the accompanying paper.<sup>14</sup>

## Results

We received questionnaires from 124 school staff before the intervention (62 teachers, 13 non-teaching assistants, 23 special needs assistants, 17 catering staff, and 9 administrative staff). The questionnaire administered by pupil post was completed by 410 (64%) of parents; response rates ranged from 39% to 85% between schools. Table 1 shows the responses of parents and staff to questions relating to the importance and relative responsibility of home and school in engendering a healthy lifestyle in children. Table 2 shows the changes in the school environment that parents hoped to see and the information they felt would be useful. Feedback to the questionnaire and changes within the school were circulated to parents during the year.

### Response rates

Table 3 shows that data were available for over 90% of pupils for most measures, indicating excellent participation in the programme by schools and staff. Response rates for the three day diet and activity diaries were satisfactory and indicated a good level of commitment by both children and parents.

### Support and training

Nineteen out of 20 teachers attended the training sessions. In anonymous questionnaires at the end of the intervention, all reported that they found the training useful, that the resources were useful and they would continue to use them, that support during the project

**Table 1** Numbers (percentages) of school staff and parents who agreed with statements regarding educating children about healthy lifestyle

	School staff (n=124)	Parents (n=410)
It is important for schools to take a major role in promoting the health of children	109 (88)	377 (92)
There should be an emphasis on teaching about balanced eating and physical activity in school	117 (94)	385 (94)
Schools should have a food policy	83 (67)	287 (70)
The family alone should not be responsible for their child's food habits and physical activity	120 (97)	328 (80)
Schools should be responsible for encouraging physical activity	108 (87)	390 (95)
A child's diet affects its health	113 (91)	373 (91)
A child's diet affects its health in adulthood	109 (88)	349 (85)

**Table 2** Summary of changes and information requested by parents when surveyed about the sort of input they felt was required in school

	No (%) of parents (n=410)
<b>Changes suggested</b>	
Promotion of healthier breaktime snacks with enforcement by school	160 (39)
Playground activities: organised games and balls, hoops, and skipping ropes to be made available	139 (34)
Healthier school meals (fewer chips and more fruit, vegetables, salads, pasta, jacket potatoes)	135 (33)
More games and sports and wider variety for all age groups	131 (32)
Ideas for healthier packed lunches	66 (16)
Joining in games and activities and tasting sessions in school	139 (34)
Parents offering skills (dance teachers, food tasting and cooking, sports coaching)	25 (6)
<b>Information requested</b>	
Material on healthy eating for children	160 (39)
Fun physical activity ideas	148 (36)
Main meal ideas	115 (28)
Breaktime snack ideas	66 (16)

**Table 3** Number (percentage) of responses for data collected

	Baseline (n=636)	At 12 months (n=632)
Anthropometric data	613 (96)	596 (94)
Diet and physical activity (24 h recall)	583 (92)	594 (94)
3 day diet and physical activity	403 (63)	407 (64)
Psychological data	593 (93)	591 (94)
Parents' questionnaire	410 (64)	

**Table 4** Examples of support offered by project manager and uptake by schools

Type of activity	No of schools
Class sessions on healthy eating	10
Competitions	10
Involvement in food awareness week	10
Attendance at parents' evenings or open days	4
Health weeks	4

was good, and that they had an increased awareness of healthy eating and physical activity among pupils.

The project manager offered a variety of ways that she could support the schools in implementing their action plans. Table 4 shows the types of activity offered and the uptake by the schools. All opted for direct input in the classroom, competitions, and involvement in a food awareness week.

### School action plans

All schools elected to incorporate nutrition education into the curriculum, with additional sessions supplied by the project manager (table 5). They also included a "fit is fun" programme in physical education lessons and undertook to improve their health resources. In total, there were 85 action points with six to 14 points per school plan; 76 (89%) of these points were successfully achieved. Reasons for not achieving action points included shortage of time, staff sickness, and impending inspection by government teaching standards officers.

### School meals

Given the emphasis on healthy eating, school meals were an important aspect of the assessment. Positive changes were seen in all schools (table 6).

### Focus groups

Compared with other children, children who had received the intervention showed greater understanding of the health benefits of diet and physical activity; sophistication of ideas and vocabulary expressed; willingness and confidence to share their ideas as well as basic knowledge. They also reported behaviour changes and were more able to recollect topics learnt and activities in school linked to diet and physical activity.

## Discussion

The evaluation of the implementation of this programme to reduce risk factors for obesity in children shows that the project was successful. Parents and school staff clearly felt that school was an important site for influencing children in their lifestyle and were supportive. The response rates for questionnaires were high, reflecting the children's and staff's eagerness to participate and commitment to the

project. The schools were ready to accept support and input at both the school and classroom level.

The results also show that the programme had a noticeable effect in the schools. Eighty nine per cent of the action points in the school action plans were implemented, and there were positive changes in classroom health education, the physical education programme, and the school food service.<sup>9</sup> School meals were also improved.

The focus groups supported the sense that the programme had had an effect at school. The children who had participated in the project readily and enthusiastically recalled the activities in which they had been involved. These children also scored higher than did children who had not yet received the programme in terms of knowledge of healthy eating, physical activity, and links between diet and health including obesity. They also attained higher scores for self reported behaviour change.

### Ways to tackle obesity

Schools provide an excellent opportunity for preventing and treating obesity.<sup>7-9</sup> They offer continual regular contact with children and opportunities for nutrition education and promotion of physical activity both within the formal curriculum and informally through a supportive environment such as healthy school meals and breaktime snacks.

To date, information on effective programmes for prevention of obesity as well as results are largely missing.<sup>11</sup> Although a healthy diet and exercise are probably unique components for such preventive programmes, currently there is no knowledge on how they should best be implemented.

Our programme used a population based approach underpinned by the Health Promoting Schools philosophy.<sup>14</sup> The population approach ensured that all children including those at risk of developing obesity were included. As the prediction for

**Table 5** Number of schools that included health promotion activities in action plan

Activity	No of schools
Nutrition education incorporated into curriculum	10
Healthy eating class sessions delivered by dietitian	10
Fit is fun programme incorporated into physical education lessons	10
Improved or updated health resources	10
Improved playground facilities	7
Policy changes regarding breaktime snacks	6
Healthy packed lunches	6
Displays or competitions	5
Invitation to outside agencies	5
Healthy tuckshops	4
Development of after school activities	3
Healthy assemblies	3
Other	7

**Table 6** Food offered by schools at lunch time

	No of schools	
	Before intervention	After intervention
Jacket potatoes	1	10
Mashed potatoes	4	6
Fresh fruit—daily	8	10
Salad vegetables—daily	4	7
Vegetarian options	Poor	Good variety

**What is already known on this topic**

Prevention of obesity is an increasingly important aspect of health promotion

Few trials have investigated school based primary prevention programmes directed at obesity

**What this study adds**

The programme was successful in producing school level changes to tackle risk factors for obesity

High levels of participation indicated support from schools, staff, parents, and pupils

Positive changes were seen in school meals, tuck shops, and playground activities

adult obesity from childhood measures is poor,<sup>5</sup> a population approach should have more effect at the public health level than targeting children who are already obese. Furthermore, behavioural and environmental conditions that contribute to the development and maintenance of obesity might be modified.

The Health Promoting Schools philosophy<sup>14</sup> is an approach that teachers can relate to, and which respects the professionalism and contribution of school staff while also viewing the child as part of a wider community. It extended beyond the classroom and ensured participation by schools, teachers, parents, caterers, and pupils in the development of the programme. This helped to ensure ownership and successful implementation.

This systematic evaluation has shown that risk factors for obesity can be successfully targeted in primary schools and that change can be achieved in the school environment and in children's knowledge base with relatively few additional resources. Given the positive effects achieved in all 10 schools, we believe the programme could be successful in other primary schools.

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Contributors: PS was the project manager and provided the main input into guiding and supporting the schools through the intervention. She collected and analysed the raw data, coordinated the programme, and drafted the article. MCJR was the principal investigator and coordinated the research team. She supervised the analysis and interpretation of the data and wrote the article jointly with PS. She will act as guarantor for the paper. RD provided the health promoting philosophy and guided the approach taken in designing the APPLIES programme. She and AJH, JHB, and JC provided support in conducting the research and contributed intellectual input into the ideas behind and final format of the paper.

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