



# **Tackling childhood obesity within schools: lessons learned from school-based interventions**

## **Summary report**

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*based on original material by Rachael Dixey and Janet Wordley*



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## 1. About this report

Internationally, there is a growing body of research on the impact of intervention programmes that contribute to changing and/or instigating change in young people's attitudes and behaviour towards following less risk-associated patterns of behaviour and/or healthy lifestyles. The purpose of this research was to review what is known regarding childhood obesity internationally and investigate the interventions that have been put in place to combat childhood obesity. In order to investigate these issues, a comprehensive literature review was conducted by Rachael Dixey and Janet Wordley from Leeds Metropolitan University. The full report of this review is available from [www.cfbt.com/evidenceforeducation](http://www.cfbt.com/evidenceforeducation). The following document summarises these findings.

## 2. Introduction

There has been increased recognition for evidence-based, school-based obesity prevention, as reflected in the numerous school-based programmes developed over recent years.<sup>1</sup> However, these programmes have differed greatly in terms of design, duration, focus and results gained.

Overall, there have been more programmes targeting the **primary-school** age group to date than targeting older children.<sup>2</sup> As it is at this age that dietary and physical activity behaviours are formed, researchers consider it entirely appropriate that interventions target primary school in order to support children in forming lasting healthy behaviours.<sup>3</sup> In terms of curriculum-based programmes, several programmes to date have utilised the existing classroom teacher to deliver the intervention<sup>4</sup> whereas others used specialist staff.<sup>5</sup> Researchers consider that having a multi-disciplinary team of health professionals supporting such health promotion initiatives is advantageous.<sup>6</sup> However this approach may not be feasible, practical or sustainable.

Whilst school-based programmes have often been successful in improving children's dietary and physical activity behaviours in school, there is less evidence to show that it improves these behaviours **outside school**.<sup>7</sup> Indeed, researchers consider it unrealistic to expect schools to facilitate changes in children's behaviours without support from families.<sup>8</sup> Very few interventions have included community involvement and it is unclear whether incorporating these components increased intervention effectiveness. However, as schools only have limited time within a school day and stretched resources to tackle obesity prevention, it seems prudent to work with representatives from industry and the wider community to tackle the issue. Future interventions would benefit from forging more community links to encourage increased physical activity and improved dietary habits out of school.<sup>9</sup>

In general, there are two types of school-based interventions, physical activity programmes and nutrition-focused programmes. These may be run individually, or combined as a multi-component intervention.



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### 3. Physical activity interventions

Physical Education classes are often an integral part of the school curriculum, and school playgrounds, playing fields, gym and sports equipment feature in most schools. The school day is organised around breaks and lunch-times, providing ideal opportunities to promote physical activity. It is not surprising that they are a common focus for interventions aimed at children.<sup>10</sup>

The most common programmes focused on physical activity, and those that have been most effective have involved lengthening the existing time of **physical education** (PE) lessons or adding new lessons.<sup>11</sup> However, schools are faced with the difficulty of implementing these programmes due to the pressures of utilising curriculum time for core subjects rather than PE.<sup>12</sup> Another concern is that a PE lesson will comprise other non-active elements such as changing. Indeed researchers describe a study of a 40-minute PE lesson where on average only eight minutes were taken up with moderate or vigorous physical activity.<sup>13</sup> Research also highlights that there are gender differences in how physical activity is perceived and what activities are appealing. Interventions that stand out include PLAY (Promoting Lifestyle Activity and Youth), where 15-minute activity breaks encouraged children in movement of any sort rather than specific or high intensity;<sup>14</sup> and New Moves, which deliberately emphasised exercise for all shapes, sizes and skills levels.<sup>15</sup> The majority of these interventions target physical activity integrated into PE lessons. Very few have considered the aspects of the school environment.<sup>16</sup>

In a small-scale study in the UK, researchers explored the effect of changing **playground markings** on activity levels of 5–7 year olds during break-times.<sup>17</sup> Children in the intervention school designed a series of markings that were then painted onto the playground. Results showed the marking significantly improved activity levels in intervention children compared with controls. Additionally, increasing the availability of balls, skipping ropes etc. and increasing length of break-times influenced children's activity behaviours.

**Walking school buses** are groups of children who walk to and from school chaperoned by responsible adults, usually a group of parents. Children can join the route at various points and those living off the route can be brought by parents to join the 'bus' as it passes. They originated in Australia as a practical solution to traffic congestion, physical activity promotion, levels of pollution and reliance on cars.<sup>18</sup> They are included here within a discussion of physical activity interventions because their primary goal is to allow children actively and safely to commute to school. Whilst walking buses have been set up in a number of countries, studies evaluating their effectiveness are limited and have shown varying results.<sup>19</sup> It appears that walking buses may increase the numbers of children walking to school, and thus increasing the amount of physical activity achieved in a day. However, sufficient input is required from a co-ordinator to ensure proper implementation and maintenance of a sustainable and effective scheme.

The ICAPS study is a multi-level **community partnership** programme run in schools aimed at improving adolescents' physical activity.<sup>20</sup> The study shows that school-based PE programmes have the potential to form community links in order to influence positively the wider environment in terms of physical activity opportunities for adolescents. Such a programme may be less effective with younger children who have less autonomy when out of school.



*Schools provide a valuable opportunity to influence children's dietary habits.*

Some interventions have included **classroom-based in addition to a PE** component. In some, the classroom-based component was education focused, giving children information about the benefits of increasing their physical activity. For instance, 'Dance for Health' is an aerobic dance programme aimed at 10–13 year old African American and Hispanic children in Palo Alto, USA.<sup>21</sup> The 12-week programme included twice-weekly dance-focused PE sessions and a supporting health education component of 25 lessons covering nutrition, exercise, obesity, smoking prevention, substance abuse, stress management and peer pressure. Significant reductions in body mass index (BMI, a measure of body fat based on height and weight) were reported between intervention and control girls, but there were no significant reductions for boys. The intervention girls' fitness improved significantly whilst intervention boys' fitness improved but not significantly. By choosing dance, the intervention ensured that all students, whatever size and shape or of whatever skill, could participate in non-competitive physical activity. Schools did not require specialist equipment and the choice of popular music ensured its appeal. However, its effectiveness with girls and not boys indicates the need to explore more thoroughly how to tailor interventions to be gender-sensitive.

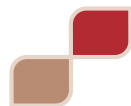
## 4. Nutrition-focused interventions

Schools provide a valuable opportunity to influence children's dietary habits. The taught curriculum offers a means of embedding nutritional education and with the majority of children and staff eating at least one meal within the setting of the school, there is an ideal opportunity to make the food environment healthier.

Schools have the potential to reach large numbers of children for education about healthy diet and in terms of nutrition-focused initiatives, researchers have highlighted that integration of nutritional education into the curriculum is a key to success.<sup>22</sup>

Studies have shown that modern **play-based methods** can be utilised effectively to convey nutrition education and facilitate learning, providing a fun alternative to simply issuing advice or prohibitions to children about what they shouldn't eat.<sup>23</sup> Educational games can be effective in promoting an increase in nutritional knowledge, but it is less clear whether they are effective in promoting dietary behaviour change. Games incorporating behaviour change techniques have shown that dietary behaviour changes can occur whilst eating at school. It is less clear whether they have an impact on dietary behaviour at home.

For instance, 'Kaledo' is a **board game** aimed at 11–14 year olds in schools in Naples, in Italy.<sup>24</sup> Players had to match differences between total energy intake (with nutrition cards) and total energy output (with activity cards). At the end of their 24-week study they reported that intervention children showed a significant improvement in their nutritional knowledge compared with control children. No significant differences were seen in BMI in either the control or intervention groups and no difference was reported between the groups. However, another study evaluating the effectiveness of a 10-session multimedia game, 'Squire's Quest', aimed at 9–10 year olds, incorporating behaviour change techniques as well as nutritional knowledge, reported dietary behaviour changes in intervention children at lunch-times and snack-times when in school, such as increased fruit and vegetable consumption.<sup>25</sup> Therefore it would appear that dietary changes occurred in eating occasions over which the children had more control.



*An innovative approach to supporting children's dietary behaviour change was the development of an interactive multimedia CD-ROM...*

Other **classroom-based nutrition education interventions** focused on the reduction of carbonated drinks consumption. A longitudinal study of 7–10 year old children in England used one-hour education sessions each term to encourage children not to drink carbonated drinks but to switch to water and diluted fruit juice.<sup>26</sup> The study reported that 12 months after the intervention had finished, the percentage of overweight and obese children in the control group had increased by 7.5% compared with intervention children, where a decrease of 0.2% was reported. However, this difference did not remain after an additional two years' follow-up, indicating that the intervention had no longer-term effects and suggesting that such interventions need to be maintained for long periods.

Several programmes have **incorporated nutritional elements into lessons** other than those immediately thought of. For instance, the 'Eat Well, Keep Moving' programme was integrated into maths, science, language, arts and social studies.<sup>27</sup>

There is evidence that primary school children's dietary habits can be positively influenced by nutrition-focused curricula that incorporate **behaviour change techniques**. In a pilot study in Michigan, US, researchers evaluated the impact of a nutrition education curriculum on 11–14 year old children's nutritional knowledge, efficacy expectations and eating behaviours.<sup>28</sup> Lessons included giving knowledge of the five food groups, balanced eating based on these groups, reading food labels, surviving fast-food restaurants and school cafeterias, as well as developing skills such as dietary self-evaluation, peer role-modelling, interpretation skills, and goal setting. Lessons were one hour in length, taught by classroom teachers who had received eight hours of in-service training. Despite its being a short-term study (10 weeks) results indicated that by the end of the programme intervention children had not only increased their nutritional knowledge but had also improved their eating behaviours and increased their efficacy expectations. They were significantly more likely to eat fruit and vegetables and less likely to eat junk food compared with those in the control group.

An innovative approach to supporting children's dietary behaviour change was the development of an **interactive multimedia CD-ROM**, designed to promote nutrition education in 12-year-old secondary school children in the UK.<sup>29</sup> The 'Dish it Up!' tool promoted autonomy and self-esteem related to healthy eating as well as teaching decision-making skills. The programme guided pupils through a virtual school day and covered a range of issues relating to a balanced diet. A key component was self-evaluation and monitoring of set goals. Intervention pupils showed statistically significant improvements in their nutritional knowledge by the end of the programme compared with controls and they also reported changes in the consumption of fruit, pasta, yogurt, breakfast cereals (more than normal) and sweets (less than normal).

All nutrition-focused interventions discussed so far have been implemented by classroom teachers. The Food Dude Programme from the UK, designed for 4–11 year olds, took a different approach, using **peer educators** to encourage children to eat more fruit and vegetables. 'Food Dudes' are role models who gain 'super powers' when they eat fruit and vegetables. Children are encouraged to try fruit and vegetables repeatedly and the idea is that they come to see themselves as fruit and vegetable eaters within a strongly supportive school ethos. Evaluations showed that fruit and vegetable eating increased to a statistically significant extent, that the effects persisted 15 months after the programme ended, that fruit and vegetable consumption went up at home, and that children ate a wider range than just that given on the programme.<sup>30</sup>

It has increasingly been recognised that the wider **school food environment** will have an influence, either positive or negative, on a child's dietary habits and behaviours.<sup>31</sup> There have been several



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studies solely targeting the 'school food environment', including breakfast clubs, strategies that increase availability or promotion of healthier options at lunch-time and snack time, free fruit schemes, and school meal standards.

**Breakfast clubs** provide before-school provision of breakfast to children arriving early to school. They originated in the US in 1966 when federal funding was given to schools to ensure they provided breakfast to children from low-income families.<sup>32</sup> Other countries such as Australia<sup>33</sup> and the UK<sup>34</sup> have since taken them up. It has been suggested that breakfast clubs can improve children's nutrition and improve their dietary intakes.<sup>35</sup> Studies also suggest that they can improve children's educational attainment, psychosocial functioning,<sup>36</sup> school attendance and punctuality.<sup>37</sup> Whilst more robust studies are required to evaluate their effectiveness, breakfast clubs may provide a means of positively influencing children's diet within the school environment.

Evidence from a cross-sectional study investigating the relationship between school lunches, **vending machine** options and adolescents' dietary intakes indicates that when students are provided with a greater availability of higher-fat foods, their intake of more healthful foods is lower.<sup>38</sup> Thus the study demonstrated that the food choices available within the school have significant effects on students' dietary intakes. Restricting vending machines has a significant effect on consumption and obesity; Researchers demonstrated that a 10% increase in the proportion of schools making 'junk' food available translated into a 1% increase in students' BMI, and where the child had an obese parent, this increased to 2%.<sup>39</sup>

In recognition of the contribution of school meals to children's diets, many countries across the world have developed **school meal guidelines**. Japan, which has enforced standards for school meals since 1954, and placed an emphasis on traditional foods within schools, has one of the lowest rates of obesity in the world.<sup>40</sup> Current school food standards in the UK are considered to be some of the most detailed in the developed world.<sup>41</sup> In each school the board of governors is legally responsible for ensuring food- and nutrient-based standards are met and schools must present evidence during Ofsted inspections that they are meeting the standards. Additionally, take-up figures for school lunches are included in the set of National Indicators used to report on performance.<sup>42</sup> No impact measures have yet been used, as it is early in the implementation of the standards. However, longitudinal studies have demonstrated that food environment modification can improve children's dietary intakes by supporting them to make healthier food choices.<sup>43</sup> Modifying the lunch-time choices available to children can improve their dietary intakes even without curriculum modification. School lunch is an important part of the diet, especially for children from lower-income families, and if healthy lunches were provided, they could greatly improve overall diet.

A study in the UK evaluated the effect of **fruit tuck shops** on 9–11 year old children's fruit consumption.<sup>44</sup> The study ran over one academic year and fruit sales increased over the autumn and spring terms but declined during the summer term; intake in intervention schools only equated to 0.06 fruits per pupil per day. However, statistically significant increases were reported in the proportion of children reporting that they used the tuck shops and that they ate fruit at school. Whilst fruit consumption increased in intervention schools, the increase was not consistent across the school year, perhaps indicating that the novelty value of the tuck shops had declined. Additional promotional activities are required in parallel with such interventions. Another school-based programme evaluating the effectiveness of healthier food kiosks reported they were not effective due to lack of regulation and lack of revenue available to schools to support them.<sup>45</sup>





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In the UK the 'National Fruit Scheme' was implemented between 2000 and 2002, with the aim that by 2004 every primary school child in the UK would receive a piece of **free fruit daily** whilst at school.<sup>46</sup> Findings showed significant differences between fruit consumption in intervention children (117g per day) and control children (67g per day). In another study evaluating the effect of free fruit on 11–12 year old children's fruit consumption in Norway, researchers reported significant improvements in fruit consumption in intervention schools compared with controls after a year.<sup>47</sup> Thus it appears that providing free fruit in this way could improve children's fruit consumption at school. However, additional work is required to understand whether eating fruit in school caused children to compensate by not eating as much fruit at home. This lack of information should not discourage schools from adopting such a scheme; the evaluation from the 'National Fruit Scheme' highlighted other benefits such as providing a social time and a time for learning, and giving support to teaching and learning about healthy eating.

Studies have demonstrated that implementing environmental **changes within a wider school and family-based nutrition-focused programme** can increase the strength of interventions.<sup>48</sup> For example, the GIMME 5 project,<sup>49</sup> a four-year dietary intervention for 14–15 year olds in schools in New Orleans, USA, aimed to increase students' fruit and vegetable intakes to five or more a day. It consisted of a school media marketing campaign to promote positive attitudes towards fruit and vegetable consumption; a series of workshops incorporating a range of learning strategies based on the Stages of Change model; an environmental intervention targeting school meals; and a parental component including brochures, newsletters and homework assignments for the parent and child to complete together, all designed to support parents in healthy eating at home. In addition parents received 'point of purchase' education which was conducted at grocery stores most frequented by parents. Parents were provided with suggestions for selecting, storing and preparing inexpensive fruit and vegetables. They were also given videos to watch at home containing information supporting the GIMME 5 curriculum. Lessons were delivered by a trained class teacher. Results showed that intervention students' knowledge increased significantly from baseline and when compared with that of control students. Intervention students' daily intakes of fruit and vegetables had significantly increased by 14% between baseline and post-programme compared with the control.

## 5. Barriers and challenges to school-based interventions

Before intervening, it is important that a full understanding is gained of the barriers and challenges facing schools in terms of implementing sustainable programmes targeting healthy eating and exercise behaviours.

In terms of physical activity programmes, **financial constraints** and budget cuts have been correlated with a reduction in the availability of extra-curricular sports programmes and a lack of facilities.<sup>50</sup> For dietary-focused programmes, challenges include school meal provision. In countries with an absence of healthy meal guidelines, it is often the case that schools on limited budgets will opt for 'fast food' cafeteria-style menus. Studies have also shown that barriers to children taking part in physical activity include cost, distance and availability for structured activities;<sup>51</sup> the threat of crime and intimidation from older children, and a perceived lack of safety of the play areas available.<sup>52</sup>



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Whilst the opportunity presented by schools for obesity prevention work has been widely recognised, it is clear that such schemes present a considerable **burden** to school administrators in terms of planning and budgeting. There is also a burden on teachers in terms of training to deliver the programme and then implementing it.

Concern has been expressed that promoting obesity prevention work in schools could have potentially **detrimental effects**.<sup>53</sup> For instance, there is potential for such programmes to stigmatise overweight children and introduce children to the concerns of weight control, fear of food, negative body image and labelling. Researchers have highlighted the considerable potential for teachers' attitudes towards obesity to be transferred through modelling to the children they teach.<sup>54</sup> Evidence suggests that prejudiced viewpoints about obese children exist amongst teachers but the extent of this is unknown.<sup>55</sup>

## 6. Conclusion

The review of effective interventions found a variety of programmes and initiatives with a range of effectiveness. Of particular note was that school-based programmes have the potential to influence children's health behaviours whilst in school but are less effective in influencing these behaviours once the children are at home. No intervention to date has found an effective means of engaging with families.

Schools alone will not solve the problem of obesity, and interventions within the education sector must be complemented by broader governmental actions to institute some of the other interventions known to help, such as promotion of breastfeeding, reform of welfare schemes such that poorer families have adequate diets, regulation of the food and drinks industries and the advertising associated with them, encouragement of active lifestyles, and so on.

There is a need for schemes that help those already overweight and obese, including children, whilst promoting approaches which do not stigmatise these groups. It is also necessary to be mindful that whole-population approaches might not be suitable in a situation where some children are underweight and/or stunted and where some children are not at risk of becoming overweight.



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