

Implementing behaviour change for healthier lifestyles in obese children

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Summary

Obesity is a major public health issue, the scale and consequences of which suggest the need for comprehensive action. It would appear that there is an imbalance between the investment in primary prevention and in secondary prevention in the form of obesity treatment. It is possible that this imbalance has contributed to our lack of progress in treating obese children effectively and at scale. We propose that an obesity centre of excellence that focuses resources on practice-based evidence on obesity treatment can contribute to progress in this field. Such a model would also provide the necessary capability to build a national scale solution. While limited, there is an evidence base that shows weight loss and weight loss maintenance and broader health and wellbeing outcomes can be achieved in children and young people. As part of the centre of excellence, a broad range of research aligned to key issues, which include poor awareness of weight issues, poor communication and marketing, greater understanding of the key ingredients of successful weight management (especially in different groups), improved methods to assess the impact of interventions and improved translation research to scale up services to meet the significant demand that exists, would all contribute to a more comprehensive solution to the issue of obesity.

Keywords: obesity, obesity treatment, outcomes, prevention, public health, children

Introduction

Childhood obesity has been identified as the modern-day plague, with some reports suggesting that today's generation of children may not outlive their parents (Bost 2004). Recent UK estimates suggest that 1 in 10 5-year-olds are obese, with 1 in 5 overweight, while 1 in 5 11-year-olds are obese and 1 in 3 are overweight (NHS Information Centre 2011). In addition to the scale of the issue, there is a wealth of evidence

demonstrating the significant negative consequences of obesity in children and young people. Freedman *et al.* (2009) reported that as body mass index (BMI) categories in children increased, the prevalence of adverse risk factors for cardiovascular disease increased exponentially in these children. Abdullah *et al.* (2011) reported that the duration of obesity in adults was an important risk factor for all-cause mortality. Lee *et al.* (2012) also found that the duration of a high BMI was strongly associated with a greater risk of type 2 diabetes.

There is now strong evidence that obesity is associated with mood disorder, binge eating, low self-regard (*e.g.* low self-esteem, body dissatisfaction and bodily shame) and lower quality of life in obese children and

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adolescents (Schwimmer *et al.* 2003). A review by Luppino *et al.* (2010) of longitudinal studies including children and adults with 59 000 participants showed that obesity increases the risk of depression by 55%. However, this study also showed that depression increased the risks of obesity by 58% highlighting a bidirectional association. A further study by Herva *et al.* (2006) showed that early obesity and depression persists into later adulthood.

The social consequences of obesity in children and young people are significant and require consideration given this is a critical period of social development. Social stigma, isolation, bullying and teasing are common in overweight and obese children and young people (Hill 2009; Lewis *et al.* 2011), and these can lead to a range of negative social consequences within important aspects of life including education, employment prospects, health care and social relationships. Data from the Millennium cohort, a study of 11 202 children measured at age three and five, show that obese boys at age five are at increased risk of behaviour problems, hyperactivity and inattention problems, as well as peer relationship problems. The long-term consequences of these issues are profound; studies show that obese children are half as likely to get into higher education (Karnehed *et al.* 2006) and less likely to complete a higher education degree (Fowler-Brown *et al.* 2010). Recent studies have suggested that the disparity in work opportunities of obese compared with normal weight young people is more strongly linked with the lack of confidence in the individuals rather than the social stigma associated with their obesity (Glass *et al.* 2010).

The complex nature of obesity therefore requires complex solutions that are not just focused on short term physical health outcomes but more holistic in approach, considering the relevant short- and long-term needs of obese children and young people.

National action to tackle obesity

The scale and the impact of childhood obesity has led to significant and widespread calls for action in both the scientific community and the general media. A major rationale for the preventative approach to childhood obesity is the ‘conveyor belt effect of obesity’, a term used by the Department of Health (2008) in England.

Despite such a view, the evidence shows that weight is relatively static in childhood (5–11 years) and adolescence (12–17 years) into adulthood. Longitudinal studies are relatively consistent in their findings, showing that once a child becomes obese the likelihood of persistence is high, with between 62% and 98%

remaining obese (O’Callaghan *et al.* 1997; Johannsson *et al.* 2006; Wardle *et al.* 2006; Singh *et al.* 2008). Tracking of normal weight is also high into adulthood suggesting few (0.5–12%) children cross weight categories from normal weight in childhood to obesity in adulthood. This suggests weight categories are established early, although it is clear more work is necessary to understand the factors that contribute to weight tracking over time and which particular groups are more susceptible to weight gain.

Obesity is often framed as an issue that requires either prevention or treatment. However, it may be more appropriate to consider action to address weight issues over a continuum and to also consider the objectives of the actions at each point. For example, the treatment of obesity could also be considered the secondary prevention of cardiovascular disease, type 2 diabetes, some forms of cancer etc. We would typically consider obesity action on a continuum with three overlapping categories of action:

- (1) primary prevention – the prevention of unhealthy weight gain;
- (2) secondary prevention/treatment of obesity – the prevention of ill health (from the co-morbidities associated with obesity);
- (3) care-related treatment – the treatment of the co-morbidities associated with obesity.

How does expenditure or investment align with these three categories?

It is well recognised that there are significant costs of obesity. The *Foresight* (DTI 2007) report outlined that the direct costs of obesity as a proportion of the overall NHS budget are set to rise over the next few decades from 7% (2007) to 9% (2015), 11.9% (2025) and 13.9% (2050). This demonstrates the significant and rising costs of treating obesity-related co-morbidities.

Regarding the cost of primary and secondary prevention activities/investments, the evidence is limited. Data from the joint National Audit Office and Health Care Commission (NAO/HCC) report (2006) suggested that between 2005 and 2008 approximately £4.6 billion would be spent on initiatives by the Departments of Health, Education, Culture Media and Sport, which were expected to contribute to tackling childhood obesity. It is clear from these descriptions that the main focus of these programmes was primary prevention of obesity. Data describing investment in secondary prevention, specifically investment in childhood obesity treatment programmes, are scarce. We therefore

reviewed the tenders that have been made available through Primary Care Trust (PCT) and Local Authority (LA) funding opportunities from 2005 and discussed with other weight management providers in England their estimates of the amount of investment in childhood obesity interventions. We estimated that between 2005 and 2010 approximately £30 million has been invested by the NHS, LAs, Big Lottery and some corporate sponsorship in treatment programmes with a primary focus to achieve a reduction in BMI standard deviation score for children to tackle childhood obesity directly.

These data highlight that there has been a significant imbalance between the investments in primary prevention (99.6% of the budget) compared with secondary prevention of ill health in the form of obesity treatment for children (0.6% of the budget). It would be prudent to undertake more research to understand the true extent of this imbalance and the reasons for it. The imbalance makes less sense when considering the fact that 1 in 3 children already have a weight problem that cannot be addressed by preventative efforts, as well as the significant physical, psychological, social and emotional needs of obese children and their future health and social care costs (Tigbe *et al.* 2012 and Hammond & Levine 2010). The use of resources is also questionable when taking account of the persistence within weight categories, such that it would appear that approximately 99.4% of the budget has been spent on 67% of the population that are currently normal weight, given that only an estimated 0.5–12% of these children are likely to become obese adults. In contrast, only 0.6% of the budget has been spent on treating overweight or obesity in the 33% of the UK children that have a weight problem, of which, it is estimated 62–98% will remain obese into adulthood. Furthermore, given the evidence that suggests weight categories are relatively stable after the age of five, it is therefore appropriate to question the scale of investment in obesity prevention strategies used post the age of five years. According to the NAO/HCC report (2006) the primary obesity prevention strategies used by the government as part of their plan to tackle childhood obesity over the last decade include the *School Sport Strategy*, *School Food Strategy* and *Healthy Schools programme*, all of which, are delivered post five years of age. The determinants of obesity and the understanding of tracking of weight status pre five years of age is less clear and therefore provides a window of potential to understand more about weight tracking in this group and approaches to prevent unhealthy weight gain. The two obesity prevention programmes that include this category are the *Play Strategy* and the *Change4Life* campaign.

The evidence base

A large number of research studies have been undertaken to assess the impact of obesity prevention and treatment programmes. These have been summarised in two Cochrane reviews. The review on obesity treatment programmes reported that small positive outcomes were achieved but that there were large differences in intervention approaches (Oude *et al.* 2009). Some criticisms of the evidence include a reliance on samples from particular research groups, a bias to white middle-class families and a lack of clarity on behaviour change approaches used. The capability to scale interventions up to address childhood obesity on a larger scale was also questioned. The review on childhood prevention programmes concluded that there is evidence of short-term impact, although the authors suggested treating the findings with caution and that it was important to consider how these interventions were embedded in national policies to tackle obesity (Waters *et al.* 2011).

Assessment of national policy and action

In 2006 the NAO/HCC published a report entitled *Tackling Child Obesity – First Steps*. The objective of this report was to ensure greater quality and efficiency of public investments and particularly the investment of public funds in achieving Public Service Agreement (PSA) targets. Within its review of the obesity PSA the NAO/HCC outlined several key findings and it was suggested that there was potential to realise efficiencies by addressing what it outlines as areas of concern; three main areas include:

- **Resources** – A lack of evidence on interventions (prevention or treatment) for tackling obesity and ring fencing of budgets. Small-scale and short-term funding has been the norm, coupled with a lack of staff with appropriate skills.
- **Partnerships** – A lack of clarity between government departments on national, regional and local priorities and responsibilities.
- **Resource management** – The emphasis for tackling childhood obesity has been through physical activity and nutrition programmes, the outcome being that childhood obesity action is seen as a coincidental benefit rather than a primary endpoint.

In 2010 the National Support Team (NST) of the Department of Health published a further report (*Childhood Obesity NST Update of findings*) (DH 2011) to assess the action taken by PCTs and LAs across England regarding childhood obesity. Many themes in common

with those identified by the NAO/HCC (2006) report emerged, which include a poor evidence base, poor data and evaluation, poor strategy and vision (*e.g.* ‘*The strategies themselves sometimes read as “wish lists” of things to be done, with no or unrealistic action plans*’). The NST also identified confusion of reporting lines between PCTs and LAs and outlined poor communication and a lack of skills within the workforce to deal with the challenges faced. Many obesity-related activities continue to be supported by short-term and small-scale funding. This demonstrates a lack of progress on the key issues outlined in 2006, despite significant investment in the issue.

In 2011, the new government published the *Call to Action on Obesity in England* (DH 2011). This document called for a greater balance between prevention and treatment investments:

Successful local strategies will need to strike a balance between ‘treatment’ interventions that help individuals to reach a healthier weight and sustained preventive effort to help to make healthy weight increasingly the norm. These are not alternatives – both are vital if we are to ‘shift the curve’.

Despite this statement, the specific details of the actions outlined demonstrate a continued focus on primary prevention with £720 million outlined for this form of activity. Action for the treatment of obesity has been assigned to LAs when *Public Health England* is established in April 2013. Given there is no specific funding for this form of intervention and there are no national or local monitoring tools in place to monitor the outcomes or impacts of obesity-related interventions, it is questionable whether there is likely to be a change in childhood obesity treatment services especially in the current economic climate.

Designing an effective care pathway

As outlined within the NAO/HCC and the NST reports many PCTs and LAs have commissioned weight management services, but often they are commissioned independently in the form of obesity prevention activities, community weight management or specialist services for both children and adults or as short-term activities. NICE (2006) guidance calls for greater integration of obesity interventions and for consideration of a wide variety of actions (*e.g.* effective communication, tailored advice, recognition of barriers etc.) to ensure high quality care. NICE guidance also recognises the need for clinical care of children and adults where necessary.

A flexible model of service delivery

Below is a set of typical interventions that are currently delivered across the UK. All of these interventions fit within the NICE guidance and many are implemented. However, it is rare for any PCT or LA to commission these services as a complete and integrated pathway.

- Adult:
 - specialist weight management services (BMI 35 + with co-morbidities or BMI 40 + without co-morbidities);
 - community weight management services (BMI 25–40);
 - self-care weight management services (BMI 25–40).
- Children:
 - specialist weight management (*i.e.* residential summer and Easter holidays);
 - community weight management services (in-school, after-school, weekends and holidays);
 - self-care weight management services (*i.e.* via the Web, telephone, text, Skype).

Professor Paul Gately has been involved in the delivery of weight management services since 1999, running a research unit at Leeds Metropolitan University called Carnegie Weight Management, which recently became MoreLife and has compiled a significant amount of experience and research evidence of the outcomes of these services. Outcomes from the residential weight loss programme for children aged 8–17 years are highly significant ($P < 0.01$) with a reduction in weight of 6 kg and 2.4 BMI units (Gately *et al.* 2005). Details of the interventions and evaluation methods have been described elsewhere (Gately *et al.* 2000a and Gately & Cooke 2003). We have also reported a range of additional physical health benefits that include significant improvements in several cardiometabolic variables (Hobkirk *et al.* 2012), as well as significant improvement in systolic and diastolic blood pressure and aerobic fitness (Gately *et al.* 2005). King *et al.* (2008) reported significant reductions in improvements in low density lipoprotein (LDL) cholesterol with the degree of LDL peak particle size significantly increased. Thus, studies have demonstrated important and broad-ranging physical health benefits in children and young people attending this form of intervention.

Our community programmes for children and young people have also lead to significant ($P < 0.01$) improvements in health variables (see Table 1) (Gately & Al Muhtadi 2011).

Table 1 The change and % change for selected variables of participants on a community weight loss intervention

Variable	Change	% change
Body mass (kg)	-0.7	0.6
BMI (kg/m)	-0.97	3.4
BMI standard deviation score	-0.16	5.9
WC (cm)	3.3	3.8
% body fat	-1.6	4.2
Systolic blood pressure mmHg	-2.3	1.9
Diastolic blood pressure mmHg	-2.97	3.9

BMI, body mass index; WC, waist circumference; mmHg, millimetres of mercury.

Psychosocial benefits

We believe that the holistic nature of our programmes also contributes to the corresponding improvements in psychosocial variables. Significant ($P < 0.05$) improvements in a range of psychological and wellbeing variables in children and young people aged 8–17 years attending our residential service have been reported (Walker *et al.* 2003). We also reported significant improvements in cognitive changes in diet and physical activity behaviours during a 6-week residential weight loss programme (Barton *et al.* 2004). In addition, a study from our team reported positive experiences in the form of enjoyment, peer support, as well as staff support and a choice of activities available to the participants (Holt *et al.* 2005). This study found that nearly half of participants reported bullying concerns prior to the programme but that they did not experience any bullying during their attendance. We believe the compassionate and nurturing environment created for the participants is a critical factor in the positive experiences reported.

In terms of the psychological benefits of our community programmes we have reported significant ($P < 0.01$) improvements in global self-worth of 0.22 (9.6%) (Gately & Al Muhtadi 2011).

Follow-up

We have previously reported the long-term outcomes of our residential model showing that 89% of participants maintained their BMI standard deviations or reduced their BMI standard deviations further at one year follow-up (Gately *et al.* 2000b). This was supported by qualitative data in both boys and girls from Hester *et al.* (2010) showing that beyond weight loss there was adoption of new lifestyle behaviours. Other important and relevant long-term impacts on the children's lives included the wearing of new styles of

clothes, improvements in school engagement and the establishment of new friendships.

Taken together, there is clearly a need for further studies to understand the long-term impact of these interventions on children and young people and their long-term health outcomes.

Care pathway outcomes

We have combined services to establish a care pathway; this approach has been used by NHS Rotherham since 2008. The care pathway approach includes continued attendance of children in the residential camp for six weeks, followed by attendance in a community club programme within their community for 12 weeks and alongside Web support, which then extends for a further six months. Service audit to date has found significant and sustainable weight loss in children and young people who have accessed this care pathway approach. Results based on 121 children show that on average there was a 19% reduction in BMI standard deviations and that 92% of children on the programme had a lower BMI standard deviations compared with baseline one year before.

Implementing scalable solutions

The outcomes of a broad range of research outlines some important steps to achieving some of the ambitions set within the NICE guidance, but we believe more needs to be done.

There is now a range of centre of excellence models in the UK, with the UK Clinical Research collaboration leading areas such as:

- CEDAR – Centre for Diet and Activity Research;
- DECIPHer – Centre for the Development and Evaluation of Complex Interventions for Public Health Improvement;
- Centre of Excellence for Public Health Northern Ireland;
- FUSE – Centre for Translational Research in Public Health; and,
- UKCTCS – UK Centre for Tobacco Control Studies.

In addition, centres of excellence like the Institute of Cancer Research, as well as several British Heart Foundation Centres of Research Excellence demonstrate other forms of centres of excellence focused on specific medical/health-related issues.

These models provide clear evidence of the importance of focusing resources to address the many and complex issues that public health and the major chronic conditions face.

Given the many complex challenges of obesity and the limited evidence base, particularly in applied interventions as outlined by the Cochrane reviews and policy documents like the *Foresight Report* (2007), it would be valuable to consider a centre of excellence approach for tackling obesity.

Given the scale of the issue and the range of challenges that exist in tackling obesity, we proposed a plan to coordinate action and ensure greater efficiency, with a focus on those most in need, which include overweight and obese children, with greater focus on those at the higher end of the weight spectrum and early years prevention.

We therefore propose an approach where a national centre of excellence with satellites is established to ensure best practice delivery, leadership, research, support and training to ensure more efficient use of resources and effective outcomes. This focus on highly specialised units would provide an environment that would overcome many of the practical and real systems challenges that are currently faced. Finally, this approach would focus on the treatment of childhood obesity and develop capability and capacity that could be scaled up to tackle childhood obesity at a national level. The three strands of the approach would enable:

- **Focused interventions** – The application of evidence-based approaches that are aligned to the needs of participants. Given the complex nature of obesity, understanding the needs of individuals and their significant family members is important. An evaluative research framework would ensure scientific rigour of these service developments and support the dissemination of findings. Focused interventions also allow for more targeted, proactive and patient-centred care. This in turn results in expert lead services with improved clinical outcomes and greater efficiency of resources. Broadly, this enables an understanding of what are the key elements of an effective systems-led approach to obesity treatment in children where lessons can be learned and easily transferred.
- **Whole person issue design** – Obesity is a heterogeneous condition and there is a need to focus interventions on individual needs rather than a ‘one size fits all’ approach. It requires thinking that is broader than traditional physical health, recognising the important influences of psychological, social and emotional health and wellbeing. By adopting a whole person focus, patients can have more appropriately designed and effective solutions. This would include more flexible access and exit points to care rather than a set period of support (usually 12 weeks), which is unlikely to match all needs. As such, those individuals with more complex needs

would not be discharged after the brief intervention period that has been commissioned is finished. In addition, it improves efficient use of resources as it stops obesity patients falling off the priority list and prevents fewer gaps in management.

- **Expert lead** – It is clear from the national reports that training of a diverse range of professionals is necessary. With centres of excellence, a new workforce could be developed with the broad range of skills and the ability to establish effective competency frameworks. Professional teams will bring expertise from a range of disciplines to ensure best practice patient care in the form of diet, physical activity promotion, behaviour change and social competencies plus other expertise areas as required.

Conclusion

There is clear evidence that obesity continues to be a major public health issue. A recent government strategy on obesity has called for greater balance between primary prevention activities to prevent unhealthy weight gain and interventions to treat overweight and obese children. At this time funding for treatment programmes has been limited, which is proposed to be a contributing factor to the lack of progress on the evidence base of this group as well as the lack of success in tackling the problem. While there are some models of good practice they are not of an appropriate scale to significantly address the issue of obesity and its consequences. Centres of excellence that focus on both high quality practice but also research are common in other areas of public health and chronic diseases, and therefore such an approach can address the many gaps that currently exist in the national vision to tackle obesity.

Conflict of interest

Professor Paul Gately is a director of MoreLife, a research unit at Leeds Metropolitan University, specialising in weight loss programmes.

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