

## Obesity in children. Part 2: Prevention and management

Ruth R Kipping,<sup>1</sup> Russell Jago,<sup>2</sup> Debbie A Lawlor<sup>1,3</sup>

<sup>1</sup>Department of Social Medicine, University of Bristol, Bristol BS8 2PS

<sup>2</sup>Department of Exercise, Nutrition and Health Sciences, University of Bristol, Bristol BS8 1TP

<sup>3</sup>MRC Centre for Causal Analysis in Translational Epidemiology, University of Bristol, Bristol BS8 2BN

Correspondence to: R Kipping [ruth.kipping@bristol.ac.uk](mailto:ruth.kipping@bristol.ac.uk)

Cite this as: *BMJ* 2008;337:a1848  
doi:10.1136/bmj.a1848

In the first part of this article we described how obesity in children is measured, its prevalence, whether children should be screened, and the risk factors for and consequences of obesity.<sup>1</sup> In this part we review the current evidence on the prevention and management of childhood obesity.

### Can obesity be prevented?

A meta-analysis and Cochrane systematic review of controlled interventions to prevent childhood obesity published up to 2005 identified 61 and 22 studies, respectively.<sup>2,3</sup> Most studies found no strong evidence that interventions prevented weight gain or obesity, and many studies were limited in design, duration, or analysis. An update of the Cochrane review will be published in 2009.

The 2005 Cochrane review concluded that comprehensive strategies that deal with diet and physical activity, interventions with psychosocial support, and those that involved environmental change may help

### SOURCES AND SELECTION CRITERIA

This review draws on the Foresight report, guidance from the National Institute for Health and Clinical Excellence and the Australian National Health Medical Research Council, and Cochrane review.

In April 2008 we searched the Cochrane Library database of reviews and the Centre for Reviews and Dissemination databases using the search term "obesity". We also conducted a Medline search ((Child\$ or paediatric or pediatric or adolescent) and (Obes\$ or overweight)) limited to 1 January 2005 to 6 May 2008 and "review articles"; this identified 1105 articles. We read the abstracts of these articles and retrieved relevant papers. We also used articles from our own bibliographies collected over the past 10 years.

The evidence to support the measurement, prevention, and management of obesity in children is still relatively weak, with few randomised controlled trials or systematic reviews. The strength of evidence is developing and the updated Cochrane review that will be published in 2009 may provide more compelling evidence for some interventions.

### TIPS FOR NON-SPECIALISTS

Start by determining the extent of overweight and then assess the child for lifestyle, comorbidities, and willingness to change

Advise children and families to increase physical activity, improve eating behaviour, and eat more healthily.

The figure provides ideal levels of activity and recommendations for healthy eating in children.

The NICE quick reference guide on obesity provides recommendations on methods for promoting these changes<sup>8</sup>

Consider referral to any available community programmes

Refer children with serious comorbidity or complex needs such as learning difficulties to secondary care paediatricians

prevent obesity. The meta-analysis concluded that most (79%) of the large number of trials aimed at preventing childhood obesity found no effect on weight gain. The investigators pooled all studies (despite the varied types of intervention and populations) in one large meta-analysis and found a "trivial" beneficial effect on average, but marked heterogeneity between studies.

In contrast to these broad reviews of all interventions, a systematic review of controlled studies with interventions to reduce sedentary activities found that such interventions consistently reduced weight in children.<sup>4</sup> A systematic review of controlled trials to promote physical activity found some evidence of effect on activity levels for environmental interventions and those targeted at children from low socioeconomic backgrounds.<sup>5</sup> Multicomponent interventions (interventions involving school or education, family, the environment, or policy changes) increased physical activity in adolescents.

The modest effectiveness of programmes aimed at individual change to prevent obesity is similar to that found for other health behaviours.<sup>2</sup> Little research has evaluated the effect of interventions at the societal and political levels to prevent obesity.

**Box 1 Summary of healthy weight, healthy lives: a cross government strategy for England<sup>7</sup>****The healthy growth and development of children**

Identify at risk families as early as possible

Promote breast feeding as the norm for mothers

Make cooking compulsory for all 11-14 year olds

£75m (€95m; \$138m) marketing programme to inform, support, and empower parents

**Promoting healthier food choices**

Develop and implement a Healthy Food Code of Good Practice to reduce consumption of saturated fat, sugar, and salt

Help local authorities to manage the proliferation of fast food outlets

Ofcom review of restrictions on the advertising of unhealthy foods to children

**Building physical activity into people's lives**

A "walking into health" campaign

£30 million to develop "healthy towns"

Develop tools to allow parents to manage the time that their children spend playing sedentary games

Review approach to physical activity

**Creating incentives for better health**

Develop pilot studies to explore how companies can best promote wellness among their staff

Pilot approaches to using personal financial incentives to encourage healthy living

**Personalised advice and support**

Develop the NHS Choices website to give personalised advice on diet and activity levels

Provide extra funding for weight management services

The French EPODE ("ensemble, prévenons l'obésité des enfants" or "together, let's prevent obesity in children") programme has worked with families of children aged 5-12 years in 10 towns since 2004 with the aim of tackling obesity.<sup>6</sup> The programme involves communities in education, nutrition, and physical activity initiatives. EPODE has not been formally evaluated, but it has been adopted by the European Commission, and an EPODE European network has been established.

Policies to promote healthy eating and physical activity in schools are in place in several countries. Examples of such programmes are the National School Lunch Program in the United States and the Healthy Schools Programme in England. As with EPODE, the effect of these policies on obesity has not been evaluated. Reviews of the emerging evidence suggest that "walkable" neighbourhoods are associated with higher levels of physical activity, but there is less evidence to show links between the environment, physical activity, and obesity (A Tsouros and C Hall, personal communication).

The English cross government "healthy weight, healthy lives" strategy aims to reverse the trend in

rising childhood obesity so that levels return to those of 2000 by 2020.<sup>7</sup> Box 1 summarises the components of the strategy. A social marketing campaign—"change4-life"—will start in England in 2008. The UK National Institute for Health and Clinical Excellence (NICE) guidelines for obesity include recommendations for the public, health professionals, preschool settings, schools, and local authorities (box 2).<sup>8</sup>

**When should interventions to prevent childhood obesity begin?**

The question of when prevention should begin has to consider when increased risk for major diseases associated with obesity is established and whether it is easier to prevent obesity at some ages rather than others. We know that childhood adiposity is related to adult cardiovascular disease<sup>9</sup> and that childhood adiposity tracks into adulthood.<sup>10</sup> Greater adiposity in children has been associated with adverse metabolic risk profiles assessed at the same age; more recently, these cross sectional associations have also been found at birth—infants who have more fat tissue (particularly visceral fat) at birth have a higher fasting insulin and adverse lipid profiles at that time.<sup>11</sup> We also know that intrauterine factors, such as maternal gestational diabetes, are associated with increased body mass index (BMI).<sup>12</sup> But we do not know if the association of childhood adiposity with adult cardiovascular disease risk is fully explained by the tracking of childhood adiposity with adiposity in adulthood, or if the

**QUESTIONS FOR FUTURE RESEARCH AND ONGOING RESEARCH****Questions for future research**

What methods are most appropriate for preventing obesity at different ages? Studies should try to ascertain which interventions work best at different ages

What type, level of intensity, and duration of preventive interventions (individual, family, or school based) are effective and cost effective in preventing obesity?

Randomised controlled trials are needed of interventions that are theory driven and have had previous feasibility and pilot studies

Are brief interventions in primary care effective in promoting a healthy diet, increasing physical activity, and reducing sedentary activities to prevent or reduce childhood obesity?

What are the most clinically effective and cost effective community based interventions for treating childhood obesity?

What is the long term clinical effectiveness and cost effectiveness of drug treatments in children?

What are the side effects of drug treatment and adherence in children at different ages?

**Ongoing research**

A prospective longitudinal study of adolescents having bariatric surgery (Teen-longitudinal Assessment of Bariatric Surgery, TABS) in the US aims to estimate the risks and benefits of bariatric surgery in adolescence

metabolic risks associated with obesity in infancy and childhood are reversible. The association of obesity with adverse outcomes at all ages has led most policy makers to aim to prevent obesity at all ages.

**How can obesity be treated?**

Much of the evidence on the treatment of obesity comes from studies of children who are extremely obese. Changes in weight (and BMI) can seem dramatic for interventions in this population compared with the general population because such children can lose large amounts of weight more easily than those in the “normal” weight range. However, such weight losses in extremely obese children may not equate to achieving a healthy weight. Interventions that are effective at treating extreme childhood obesity cannot be assumed to be suitable for treating more modest overweight or for preventing obesity. Many countries have developed guidelines for managing childhood obesity; differences in these reflect variations in the structure of health services, resources, culture, and behaviours between countries. The further educational resources section has links to guidelines from the US and Australia.<sup>13 14</sup>

**How can non-specialists treat obese children?**

The NICE clinical guidelines provide recommendations for non-specialist clinicians (figure). Non-specialists should offer interventions to increase physical activity and encourage children and their families to eat healthily (figure).<sup>15</sup> The NICE quick reference guide for the NHS gives further advice about the type of interventions that are appropriate.<sup>8</sup>

**What community programmes can non-specialists refer to?**

Before considering referral to secondary care, it may be appropriate to consider community based treatment programmes. MEND (mind, exercise, nutrition . . . do it!) is the only programme provided nationwide in the United Kingdom. MEND is a twice weekly 10 week course for groups of children aged 7-13 and their parents. The course covers physical activity, behaviour change, and nutrition. To be included, children must be on or above the 91st to the 98th BMI centile (criteria vary locally). The full evaluation of MEND has yet to be published, but early data indicate that the programme has some promise as a means of reducing BMI, with the pilot evaluation reporting an average reduction of 0.24 BMI z scores.<sup>17</sup>

Children who attended the Carnegie International Camp in Leeds (England) for a mean of 29 days lost 6.0 kg on average, reduced their BMI by a mean of 2.4 units, and reduced their BMI standard deviation scores by a mean of 0.28.<sup>18</sup> Two free living comparison groups of overweight and normal weight children showed increases in many of these measures. This intervention needs to be evaluated by a randomised controlled trial and a cost effectiveness study. WATCH IT is a community based obesity programme provided in sports centres in Leeds, which provides individual

**Box 2 National Institute for Health and Clinical Excellence recommendations for preventing obesity in children<sup>8</sup>**

**Recommendations for the public**

Children and young people should have regular meals in a pleasant, sociable environment with no distractions (such as television); parents and carers should join them as often as possible

Gradually reduce the time children are sitting in front of a screen

Encourage games that involve running around, such as skipping, dancing, or ball games

Be more active as a family, by walking or cycling to school, going to the park, or swimming

Encourage children to take part in sport inside and outside school

**Recommendations for health professionals**

For families at high risk (for example, those where one or both parents are obese) offer individual counselling and ongoing support. Consider family based and individual interventions, depending on the age and maturity of the child

In preschool settings, use a range of components. For example, offer interactive cookery demonstrations, videos, and discussions on meal planning and shopping for food and drink; in addition, offer interactive demonstrations, videos, and group discussions on physical activities, opportunities for active play, safety, and local facilities

In family programmes to prevent obesity, provide ongoing tailored support and incorporate behaviour change techniques

**Recommendations for preschool settings**

Provide regular opportunities for enjoyable active play and structured physical activity sessions

Ensure that children eat regular healthy meals in a supervised, pleasant, sociable environment, free from distractions

**Recommendations for schools**

Ensure that school policies and the whole school environment encourage physical activity and a healthy diet

Train all staff in how to implement healthy school policies

Create links and partnerships between sports clubs and schools

Promote physical activities that children can enjoy outside school and into adulthood

Ensure that children and young people eat meals in a pleasant, sociable environment, free from distractions

**Recommendations for local authorities and their partners**

Work with the community to identify barriers to physical activity

Ensure that the design of buildings and open spaces encourages people to be more active

Encourage active travel, and promote and support physical activity schemes

Encourage local shops and caterers to promote healthy food choices

and group sessions for children (aged 8-16 years with a BMI above the 98th centile) and their parents. To date, this programme has not been evaluated in a controlled trial.<sup>19</sup> The Care of Childhood Obesity programme in Bristol is a hospital based multidisciplinary service, which is being piloted for use in the community before full evaluation.<sup>20</sup>

Commissioners of health services face several challenges in deciding what community services they need to commission to treat obese children. Because the current number of obese children is large, treating all of them is probably beyond the capacity of secondary care. The costs of implementing community based programmes, such as those described above, need to be considered against the long term health costs of no treatment. Although there is pressure for immediate action the current evidence, particularly on cost effectiveness, is limited. Where effectiveness has been demonstrated in the short term it is difficult to

know which intervention is best, and randomised comparisons of different community based programmes would be useful.

**When should children be referred?**

Different countries have different guidelines on when children should be referred and who they should be referred to—for example, paediatric endocrinologists, general paediatricians, dietitians, psychologists, or multidisciplinary teams. The NICE clinical guideline recommends referral to secondary care specialists if the child has serious comorbidities or complex needs, such as learning difficulties.<sup>8</sup>

**What drug treatment is recommended for children?**

Systematic reviews of randomised controlled trials in adults have shown that drugs are effective at reducing weight and associated metabolic complications, although adults do not adhere well to long term

Non-specialist management	Specialist management in secondary care
<p><b>Determine degree of overweight or obesity</b></p> <ul style="list-style-type: none"> <li>• Use clinical judgment to decide when to measure weight and height</li> <li>• Use UK 1990 BMI charts for age to give age and sex specific information</li> <li>• Do not use waist circumference routinely, although it can give information on risk of long term health problems</li> <li>• Discuss with the child and family</li> </ul>	<p><b>Assessment in secondary care</b></p> <p>Assess comorbidities and possible aetiology; carry out investigations such as:</p> <ul style="list-style-type: none"> <li>• Blood pressure</li> <li>• Fasting lipid profile</li> <li>• Fasting insulin and glucose concentrations</li> <li>• Liver function tests</li> <li>• Endocrine investigations</li> </ul> <p>Take into account the degree of overweight or obesity, the child's age, comorbidities, family history of metabolic diseases, and possible genetic causes</p>
<p><b>Consider intervention or assessment</b></p> <ul style="list-style-type: none"> <li>• Consider tailored clinical intervention if BMI <math>\geq</math>91st centile</li> <li>• Consider assessing for comorbidities if BMI <math>\geq</math>98th centile</li> </ul>	<p><b>Drug treatment</b></p> <p>Consider only after dietary, exercise, and behavioural approaches have been started and evaluated</p> <ul style="list-style-type: none"> <li>• Not recommended for children under 12 except in exceptional circumstances</li> <li>• For children <math>\geq</math>12 years, only if they have physical comorbidities (such as sleep apnoea) or severe psychological comorbidities</li> <li>• Multidisciplinary teams with appropriate expertise may prescribe a 6-12 month trial of orlistat or sibutramine with regular review</li> </ul>
<p><b>Assess the following</b></p> <ul style="list-style-type: none"> <li>• Presenting symptoms and underlying causes of overweight or obesity</li> <li>• Willingness to change</li> <li>• Risk factors and comorbidities, such as hypertension, hyperinsulinaemia, dyslipidaemia, type 2 diabetes, psychosocial dysfunction, exacerbation of asthma</li> <li>• Psychosocial distress—low self esteem, bullying</li> <li>• Family history of overweight, obesity, and comorbidities</li> <li>• Lifestyle—diet and physical activity</li> <li>• Environmental, social, and family factors</li> <li>• Growth and pubertal status</li> </ul>	<p><b>Surgery</b></p> <p>Surgery is not generally recommended for children or young people. Consider surgery for young people only in exceptional circumstances, and if:</p> <ul style="list-style-type: none"> <li>• They have achieved or nearly achieved physiological maturity</li> <li>• They have a BMI <math>\geq</math>40, or a BMI between 35 and 40 and other disease (for example, type 2 diabetes, high blood pressure) that might improve if they lost weight</li> <li>• All appropriate non-surgical measures have failed to achieve or maintain adequate clinically beneficial weight loss for at least 6 months</li> <li>• They are receiving or will receive intensive specialist management</li> <li>• They are generally fit for anaesthesia and surgery</li> <li>• They commit to the need for long term follow-up</li> </ul> <p>Guidance is provided on further discussions, assessment, medical evaluation, and choice of intervention</p>
<p><b>Management</b></p> <p>Offer interventions including strategies to change behaviour that encourage:</p> <ul style="list-style-type: none"> <li>• Increasing physical activity to at least 60 minutes a day of moderate activity, which can be in 10 minute sessions; reducing sedentary activities; increasing structured activity and daily exercise</li> <li>• Improving eating behaviour. Interventions should be individualised, age appropriate, and aimed at reducing total energy intake to below expenditure, without using unduly restrictive diets</li> <li>• Healthy eating</li> </ul> <p>Consider referral to a specialist if the child has:</p> <ul style="list-style-type: none"> <li>• Serious comorbidity or</li> <li>• Complex needs such as learning or educational difficulties</li> </ul>	

Summarised National Institute for Health and Clinical Excellence guidelines for management of overweight and obesity in children.<sup>8</sup> The *BMJ* clinical review of breast feeding indicates that in 2009 the 2006 WHO growth charts will need to be used for babies from 2 weeks to 2 years<sup>16</sup>

treatment with orlistat and sibutramine.<sup>21</sup> A non-systematic review summarised the effect of drug treatment in children and noted a mean reduction of BMI in obese adolescents of  $-0.86$  for orlistat,  $-2.8$  for sibutramine, and  $-1.38$  for metformin.<sup>22</sup>

Treatment with orlistat or sibutramine is not recommended by NICE for children younger than 12 years unless the circumstances are exceptional.<sup>8</sup> It is recommended for children aged 12 years and over if they have physical or severe psychological comorbidities, and only after dietary, exercise, and behavioural approaches have been started and evaluated (figure). NICE recommends that treatment be started in secondary care (not in primary care) for six to 12 months and monitored regularly (frequency not specified in guidance) by a multidisciplinary team with expertise in drug monitoring, psychological support, and behavioural interventions. In the US, the Food and Drug Administration has approved sibutramine for patients aged 16 or more and orlistat for those aged 12 or more.<sup>13</sup>

Rimonabant was approved for treating obesity in adults in Europe in 2006, but it was not included in the NICE review of obesity. A meta-analysis of randomised trials suggests that the drug might increase the risk of psychiatric adverse events in patients with no previous history.<sup>23</sup> A Cochrane review evaluated the use of rimonabant in adults and concluded that more rigorous studies of efficacy and safety were needed.<sup>24</sup> In the US, the Food and Drug Administration has requested further safety data before making a licensing decision. The UK Medicines and Healthcare Products Regulatory Agency and Commission on Human Medicines reported in May 2008 that insufficient data are available to assess the risk for children under 18 years.

#### When is bariatric surgery recommended for children?

The two bariatric surgical approaches used for adolescents are Roux en Y gastric bypass (the more commonly performed procedure in the US) and laparoscopic adjustable gastric banding (the more commonly performed procedure in Europe and Australia).<sup>25</sup> In the US, the annual number of bariatric procedures carried out in adolescents increased five times between 1997 and 2003.<sup>26</sup> Case series of young people in Australia and the US report that, although surgery has considerable risks, larger decreases in BMI (in the order of  $20.7$  ( $37\%$ ))<sup>27</sup> and greater improvements in some metabolic markers are achieved with surgery than with non-surgical methods.<sup>25</sup> Although surgery is not generally recommended by NICE for obese children or young people, it should be considered in exceptional circumstances if certain conditions are met (figure).

#### What does the future hold?

The recent Foresight report for the UK government suggested that a substantial increase in food or fuel prices, such as precipitated by climate change, might be the only scenario in which a spontaneous reversal of

#### Additional educational resources

##### Resources for healthcare professionals

- National Institute for Health and Clinical Excellence. *Obesity: the prevention, identification, assessment and management of overweight and obesity in adults and children*. 2006. [www.nice.org.uk/guidance/index.jsp?action=byID&o=11000](http://www.nice.org.uk/guidance/index.jsp?action=byID&o=11000)
- National Institute for Health and Clinical Excellence. *Quick reference guide 2 for the NHS. Obesity: the prevention, identification, assessment and management of overweight and obesity in adults and children*. 2006. [www.nice.org.uk/nicemedia/pdf/CG43quickrefguide2.pdf](http://www.nice.org.uk/nicemedia/pdf/CG43quickrefguide2.pdf)
- Government Office for Science. Foresight. *Tackling obesities: future choices*. 2007. [www.foresight.gov.uk/Obesity/14.pdf](http://www.foresight.gov.uk/Obesity/14.pdf)
- Department of Health. *Healthy weight, healthy lives: a cross government strategy for England*. 2008. [www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_082378](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_082378)
- US Expert Committee. *Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: summary report*. 2007. [www.pediatrics.org/cgi/content/full/120/Supplement\\_4/S164](http://www.pediatrics.org/cgi/content/full/120/Supplement_4/S164)
- National Obesity Observatory ([www.noo.org.uk](http://www.noo.org.uk))—Information for England on data, evidence and practice related to obesity, overweight, underweight and their determinants
- International Obesity Taskforce ([www.iof.org](http://www.iof.org))—Organisation that seeks to support new strategies to improve diet and activity and prevent obesity and related chronic diseases, with a special focus on preventing childhood obesity
- Australian Government. National Health and Medical Research Council. *Clinical practice guidelines for the management of overweight and obesity in children and adolescents*. 2003 [www.health.gov.au/internet/main/publishing.nsf/Content/obesityguidelines-guidelines-children.htm](http://www.health.gov.au/internet/main/publishing.nsf/Content/obesityguidelines-guidelines-children.htm)
- Association for the Study of Obesity ([www.aso.org.uk](http://www.aso.org.uk))—Organisation dedicated to the understanding and treatment of obesity
- National Obesity Forum ([www.nationalobesityforum.org.uk](http://www.nationalobesityforum.org.uk))—An independent charity that works to improve the prevention and management of obesity
- Resources for parents and patients**
- National Institute for Health and Clinical Excellence. *Understanding NICE guidance. Treatment for people who are overweight or obese*. 2006. [www.nice.org.uk/nicemedia/pdf/CG43publicinfo1.pdf](http://www.nice.org.uk/nicemedia/pdf/CG43publicinfo1.pdf)
- National Institute for Health and Clinical Excellence. *Understanding NICE guidance. Preventing obesity and staying a healthy weight*. 2006. [www.nice.org.uk/nicemedia/pdf/CG43publicinfo2.pdf](http://www.nice.org.uk/nicemedia/pdf/CG43publicinfo2.pdf)
- Department of Health. *Why your child's weight matters*. 2007. [www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_073655](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_073655)

## SUMMARY POINTS

Few obesity prevention interventions have been shown to be effective in children

Comprehensive strategies that tackle diet and physical activity as well as providing psychosocial support and environmental change may help prevent obesity

Community based interventions aimed at changing activity levels, dietary knowledge, and eating behaviour may be useful but need evaluation for effectiveness and cost effectiveness

Specialist treatment may include treatment with sibutramine or orlistat in children over 12, although long term studies are needed

Surgery is recommended only in adolescents with extreme obesity, in limited circumstances, but the benefits need to be balanced against the possible side effects

obesity would occur.<sup>28</sup> Otherwise, the Foresight report argues that a paradigm shift at societal and government levels is needed. If this shift does not occur, it is predicted that by 2050 the prevalence of obesity in under 20 year olds will be 25% in the UK.<sup>28</sup>

**Contributors:** All authors discussed the scope and approach to the review. RRK drafted the review. All authors helped write the paper. All authors are guarantors.

**Competing interests:** None declared.

**Provenance and peer review:** Commissioned; externally peer reviewed.

- 1 Kipping RR, Jago R, Lawlor DA. Obesity in children. Part 1: Epidemiology, measurement, risk factors, and screening. *BMJ* 2008;337:a1824.
- 2 Stice E, Shaw H, Marti CN. A meta-analytic review of obesity prevention programs for children and adolescents: the skinny on interventions that work. *Psychol Bull* 2006;132:5:667-91.
- 3 Summerbell CD, Waters E, Edmunds LD, Kelly S, Brown T, Campbell KJ. Interventions for preventing obesity in children. *Cochrane Database Syst Rev* 2005;(3):CD001871.
- 4 DeMattia L, Lemont L, Meurer L. Do interventions to limit sedentary behaviours change behaviour and reduce childhood obesity: a critical review of the literature. *Obes Rev* 2007;8:69-81.
- 5 Van Sluijs EMF, McMinn AM, Griffin SJ. Effectiveness of interventions to promote physical activity in children and adolescents: systematic review of controlled trials. *BMJ* 2007;335:703.
- 6 Westley H. Thin living. *BMJ* 2007;335:1236-7.
- 7 Department of Health. *Healthy weight, healthy lives: a cross government strategy for England*. London: Department of Health, 2008.
- 8 National Institute for Health and Clinical Excellence. *Quick reference guide 2 for the NHS obesity: the prevention, identification, assessment and management of overweight and obesity in adults and children*. 2006. [www.nice.org.uk/guidance/index.jsp?action=download&o=30364](http://www.nice.org.uk/guidance/index.jsp?action=download&o=30364).
- 9 Baker JL, Olsen LW, Sorensen TI. Childhood body-mass index and the risk of coronary heart disease in adulthood. *N Engl J Med* 2007;357:2329-37.
- 10 Whitaker RC, Wright JA, Pepe MS, Seidel KD, Dietz WH. Predicting obesity in young adulthood from childhood and parental obesity. *N Engl J Med* 1997;337:869-73.
- 11 Yajnik CS, Lubree HG, Rege SS, Naik SS, Deshpande JA, Deshpande SS, et al. Adiposity and hyperinsulinemia in Indians are present at birth. *J Clin Endocrinol Metab* 2002;87:5575-80.
- 12 Pettitt DJ, Nelson RG, Saad MF, Bennett PH, Knowler WC. Diabetes and obesity in the offspring of Pima Indian women with diabetes during pregnancy. *Diabetes Care* 1993;16:310-4.
- 13 Barlow SE and the Expert Committee. Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: summary report. *Pediatrics* 2007;120:S164-92.
- 14 National Health and Medical Research Council. *Clinical practice guidelines for the management of overweight and obesity in children and adolescents*. 2003 [www.health.gov.au/internet/main/publishing.nsf/Content/obesityguidelines-guidelines-children.htm](http://www.health.gov.au/internet/main/publishing.nsf/Content/obesityguidelines-guidelines-children.htm).
- 15 Young KM, Northern JJ, Lister KM, Drummond JA, O'Brien WH. A meta-analysis of family-behavioral weight-loss treatments for children. *Clin Psychol Rev* 2007;27:240-9.
- 16 Hoddinott P, Tappin D, Wright C. Breast feeding. *BMJ* 2008;336:881-7.
- 17 Sacher PM, Kolotourou M, Chadwick P, Singhal A, Cole TJ, Lawson MS. The MEND programme: effects on waist circumference and BMI in moderately obese children. *Obes Rev* 2007;8(suppl 3):7-16.
- 18 Gately PJ, Cooke CB, Barth JH, Bewick BM, Radley D, Hill AJ. Residential weight loss programmes can work: a cohort study of acute outcomes for overweight and obese children. *Pediatrics* 2005;116:73-7.
- 19 Rudolf M, Christie D, McElhone S, Sahota P, Dixey R, Walker J, et al. WATCH IT: a community based programme for obese children and adolescents. *Arch Dis Child* 2006;91:736-9.
- 20 Sabin MA, Ford A, Hunt L, Jamal R, Crowne EC, Shield JP. Which factors are associated with a successful outcome in a weight management programme for obese children? *J Eval Clin Pract* 2007;13:364-8.
- 21 Padwal R, Li SK, Lau DC. Long-term pharmacotherapy for obesity and overweight. *Cochrane Database Syst Rev* 2004;(3):CD004094.
- 22 Freemark M. Pharmacotherapy of childhood obesity: an evidence-based, conceptual approach. *Diabetes Care* 2007;30:395-402.
- 23 Christensen R, Kristensen PK, Bartels EM, Bliddal H, Astrup A. Efficacy and safety of the weight-loss drug rimonabant: a meta-analysis of randomised trials. *Lancet* 2007;370:1706-13.
- 24 Curiñoni C, André C. Rimonabant for overweight or obesity. *Cochrane Database Syst Rev* 2006;(4):CD006162.
- 25 Shield JPH, Crowne E, Morgan J. Is there a place for bariatric surgery in treating childhood obesity? *Arch Dis Child* 2008;93:369-72.
- 26 Schilling PL, Davis MM, Albanese CT, Dutta S, Morton J. National trends in adolescent bariatric surgical procedures and implications for surgical centers of excellence. *J Am Coll Surg* 2008;206:1-12.
- 27 Lawson ML, Kirk S, Mitchell T, Chen MK, Loux TJ, Daniels SR, et al, Pediatric Bariatric Study Group. One-year outcomes of Roux-en-Y gastric bypass for morbidly obese adolescents: a multicenter study from the Pediatric Bariatric Study Group. *J Pediatr Surg* 2006;41:137-43; discussion 137-43.
- 28 Government Office for Science. Foresight. *Tackling obesity: future choices—project report*. 2nd ed. 2007. [www.foresight.gov.uk/Obesity/14.pdf](http://www.foresight.gov.uk/Obesity/14.pdf).

## What types of article does the *BMJ* consider?

We are delighted to receive articles for publication—from doctors and others—on the clinical, scientific, social, political, and economic factors affecting health. We give priority to articles that will help doctors to make better decisions. Please see our advice to authors at <http://resources.bmj.com/bmj/authors>, and if you would like to submit an article do so via our online editorial office at <http://submit.bmj.com>.

All original research articles are submitted, although we may invite submission (without promising acceptance) if we come across research being presented at conferences, if

we see it in abstract form, or if the authors make an inquiry about the suitability of their work before submission.

We are also pleased to consider submitted articles for sections which carry a mix of commissioned and submitted articles—editorials, analysis, clinical review, practice, fillers, and Career Focus. Please follow the specific advice on each of these article types (see <http://resources.bmj.com/bmj/authors/types-of-article>) before submitting your article. Some types of article—news, features, observations, head to head, views and reviews—are commissioned by the editors.