

Children's BMI, overweight and obesity

11

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Summary

- There is a considerable body of evidence that links childhood overweight and obesity with a number of long-term and immediate physiological and psychological health risks. This chapter examines the patterns of overweight and obesity among children aged 2-15, and the relationship between these measures and a number of demographic variables. Children's own perceptions of their weight and their parents' perceptions are also examined.
- Mean body mass index (BMI) was slightly lower for boys than girls (18.1kg/m² and 18.4kg/m² respectively). In both boys and girls mean BMI increased with age, from 16.5kg/m² for boys and 16.4kg/m² for girls aged 2-4 to 20.9kg/m² for boys and 21.9kg/m² for girls aged 13-15.
- Among children aged 2-15, 14% of both boys and girls were classed as obese, and 28% of both boys and girls were classed as either overweight or obese. Children aged 11-15 were more likely to be obese (19% of both boys and girls) than those aged 2-10 (11% and 10% respectively).
- Levels of obesity varied according to socio-economic status. Among children aged 2-15, levels of obesity were highest for boys in the lowest quintile of equivalised household income (19%) and for girls in the three lowest quintiles (15% to 17%). Likewise, the prevalence of obesity was higher among those living in the two most deprived quintiles of the Index of Multiple Deprivation (16% to 19% for both boys and girls).
- Among boys aged 2-15, mean BMI increased by 0.4kg/m² between 1995 and 2012 (from 17.7kg/m² to 18.1kg/m²). For girls, the increase was 0.3kg/m² from 18.1kg/m² to 18.4kg/m².
- The prevalence of obesity has increased since 1995, when 11% of boys and 12% of girls aged 2-15 were obese. There was a steady increase up to around 2004 and 2005, where obesity peaked at 18% to 19% among both boys and girls. Levels have been slightly lower than this peak in the last few years, with little change, with 17% of boys and 16% of girls obese in 2011. The levels in 2012, at 14% for both boys and girls, were lower than in 2011 though not statistically significantly so.
- There were differences in trends according to age. Among both boys and girls, there was a similar pattern of increase for those aged 2-10 and 11-15 up to the peak around 2004/2005; since then the proportion who were obese in the 11-15 age group has remained at a broadly similar level (with some fluctuation) among both sexes. Among those aged 2-10 the proportion who were obese has decreased significantly from 17% of both boys and girls in 2005 to 11% of boys and 10% of girls in 2012.
- When children aged 8-15 were asked about their perception of their weight, 61% of boys and 54% of girls felt that they were about the right weight, while 11% of boys and 15% of girls felt that they were too heavy, and 8% of boys and 4% of girls thought they were too light (19% of boys and 26% of girls were not sure). The majority of children

who thought themselves too heavy were obese (65%). Of those children who thought of themselves as about the right weight, 21% were overweight or obese.

- The majority of parents of boys and girls aged 4-15 were able to accurately judge if their child was too heavy. However, just under a quarter of parents who thought that their child was about the right weight in fact had a child who was overweight or obese (23% among both fathers and mothers). The mean BMI at which fathers reported that children were overweight was lower than for mothers (23.6kg/m² for fathers and 24.7 kg/m² for mothers).
- The majority of children aged 8-15 said that they were not trying to change their weight (68% of boys and 66% of girls), while 21% of boys and 32% of girls said they were trying to lose weight. Among those who said they were trying to lose weight 26% were overweight and 48% were obese. However, 25% of children aged 8-15 who were obese were not trying to change their weight, and neither were 50% of those who were overweight.

11.1 Introduction

Obesity and its associated health risks continue to provoke national and international concern. Estimates from the Foresight report in 2007, based on HSE data from 1993-2004, suggested that by 2050, 55% of boys and 70% of girls aged under 20 could be overweight or obese.¹ However, a more recent update on these trends, based on HSE data from 2000 to 2007, indicated a healthier picture; these suggested that by 2020 13% of boys and 10% of girls aged 2-11 might be obese.² The most recent National Child Measurement Programme (NCMP) results, for 2011/12, show that 9.5% of children in Reception classes (aged 4-5) and 19.2% of children in Year 6 (aged 10-11) were obese. The proportion who were obese in Reception was lower than when the programme began in 2006/07 (9.9%), while the proportion in Year 6 was higher than in 2006/07 (17.5%).³

Over past years there have been many policies and strategies aimed at tackling obesity, such as the White Paper *Choosing Health: Making Healthier Choices Easier*, which aimed to prevent any further rises in obesity among children under 11.⁴ In November 2010 the government announced an ongoing strategy to improve public health in its white paper *Healthy Lives, Healthy People: Our Strategy for Public Health in England*.⁵ The paper set out key areas to focus on in its aim to improve the lives of people in the UK. Included in these were the continued support for school-aged children through the Healthy Child Programme,⁶ and assistance with local services to tackle overweight and obesity through the National Child Measurement Programme.⁷ Following this 2010 white paper, The Public Health Responsibility Deal⁸ was announced in 2011, with a view to encouraging local businesses and the voluntary sector to support people to live healthier lives by informing their lifestyle choices in areas such as healthy eating and physical activity. Preventative measures were also outlined in the 2009 Change4Life campaign⁹ which focussed on encouraging families to eat healthily and improve levels of physical activity.

In October 2011, these commitments were reinforced by a further pledge to tackle overweight and obesity in the context of the new structure of the NHS and Public Health England. *Healthy Lives, Healthy People: a call to action on obesity in England*¹⁰ set out rigorous plans to engage people in healthier lifestyles across all life stages, starting from pre-conception through to old age. The degree to which obesity and overweight have become a problem was acknowledged in the paper and recommendations were centred around local and national level partnerships, with a view to reducing excess weight by 2020.

Overweight and obesity are terms that refer to an excess of body fat. Body mass index (BMI) relates to increased weight-for-height and is a frequently used measure of obesity and overweight. The two terms denote different degrees of excess adiposity (body fat), and overweight can be thought of as a stage where an individual is at risk of developing obesity.¹¹ The adverse health consequences associated with obesity are mostly related to an increased adiposity rather than increased weight per se¹² and it is therefore important that any indicator of obesity reflects this increased adiposity.

The increasing body of evidence that links obesity with numerous long-term and immediate physiological health risks highlights the importance of studying early overweight and obesity. Childhood and adolescent obesity can persist into adulthood, where the direct health risks of obesity are severe and well-established. It has been estimated that up to 50% of obese adolescents remain obese in adulthood.^{13,14} Other studies have linked childhood and adolescent overweight and obesity directly to middle-age mortality and a range of chronic diseases in adult life.^{15,16,17,18,19} In addition to the increased risk for health problems in later life, children face immediate health consequences of obesity, including increased risks for an abnormal lipids profile and elevated blood pressure.²⁰ Associations between childhood obesity and increased asthma prevalence²¹ and the incidence of type 2 diabetes mellitus²² have also been reported.

As well as the physiological health risks that arise as a result of obesity, the psychological effects of obesity are also being increasingly recognised; many of which can continue into adulthood. Studies have shown high levels of dissatisfaction with body size and shape amongst adolescents as well as a desire to be thinner, which increases in line with body

mass and is more prevalent among girls.^{23,24,25} Other links to the psychological effects of obesity have been found to include low self esteem or self image,²⁶ and depression.²⁷ Symptoms of depression in adolescents have also been linked to higher BMI and low levels of physical activity,²⁷ particularly among young women.²⁸

The influence of family is vital to the prevention and treatment of childhood obesity.²⁹ Adults play a large role in influencing the content and availability of food, as well as the food choices that children make.³⁰ Moreover, studies have highlighted the pattern between the weight status of children and their parents, showing a clear link between the BMI of children and their mother's BMI.³⁰ The need to understand the health consequences of excess weight and to recognise the need for weight management is a pre-requisite for preventing and tackling obesity. Yet evidence suggests that parents who underestimate the weight status of their overweight or obese children may be less likely to provide them with the support they need to achieve a healthy weight.³¹ Studies have shown that, among parents of pre-school children, as many as 90% do not correctly identify their child as overweight when this is the case.³²

This chapter examines patterns of obesity and overweight among children aged 2-15, and the relationship between these and demographic and attitude variables. Trend data on key HSE measures, including child obesity, are available in *Health Survey for England 2012 trend tables* on the Health and Social Care Information Centre website.³³

11.2 Methods and definitions

11.2.1 Methods

Children aged 2-15 had their height and weight measured and BMI was calculated from the valid readings. The calculation uses sex and exact age in 6 month bands (extracted from the date of interview minus the date of birth). Presentation of the results is based, however, on the *age at last birthday*, which is the HSE standard. Also in line with the HSE standard for children, none of the results in this chapter have been age-standardised.

Trends from HSE years 1995 to 2012 show BMI, overweight and obesity prevalence calculated for children aged 2-15. Children were first included in the HSE in 1995 and since then weighting has been necessary to compensate for the fact that the number of children interviewed in a household is limited to two (in households with more, two are selected at random). This weighting is used to ensure that the age/sex distribution of selected children matches that of all children in co-operating households. Non-response weighting was also introduced in 2003. The child-selection weighted estimates are shown for 1995-2002 and the non-response weighted estimates (including adjustment for child selection) for 2003-2012. National trend data are presented separately for three age groups: 2-10, 11-15 and 2-15.

Questions about children's perceptions of their own weight and their desire to change their weight have been asked since 2006. Children aged 8-15 were asked as part of a self-completion questionnaire whether or not they thought they were about the right weight and whether they were trying to change their weight. In 2012 parents (including legal guardians) of children aged under 16 were asked about their perceptions of their child's weight. These questions were included in the self completion booklet for adults, and both mothers and fathers were asked to give their views. This was slightly different from 2011, when one parent, usually the mother, was asked about their perception of their child's weight in a separate booklet relating specifically to the child. Analyses of parents' perceptions are presented in Tables 11.7-11.9, and it should be noted that there are relatively small numbers of children for whom parent information is also available. Therefore in some cases data for boys and girls have been combined, and margins of error for some of the estimates are wide.

11.2.2 Definitions

Body mass index (BMI), calculated as weight (kg) divided by height squared (m²), has been shown to correlate strongly with adiposity in adults^{34,35} and children.^{4,36,37} It is the key measure of overweight and obesity used in this chapter. The decision to use BMI is supported by

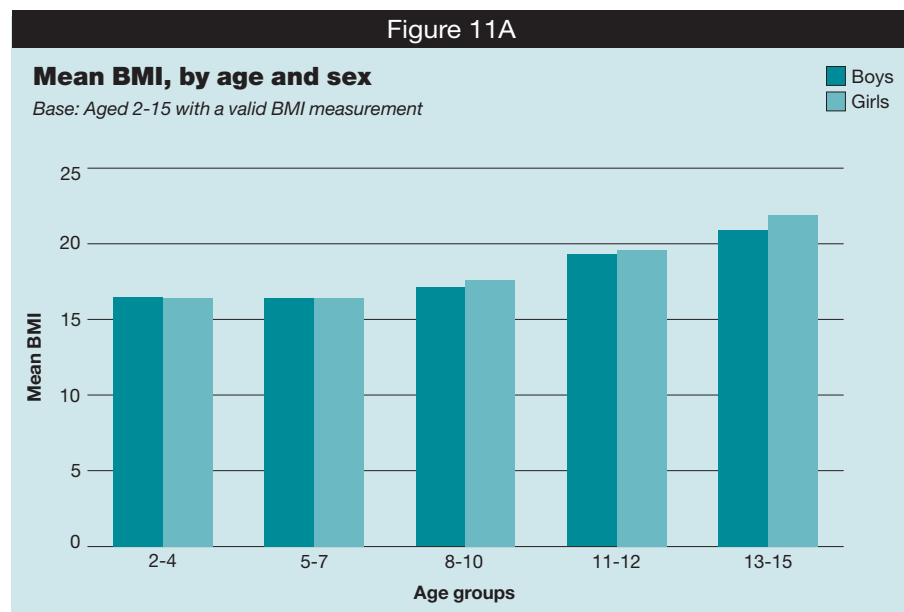
recommendations made by the International Obesity Task Force, which concluded that BMI is a reasonable measure of body adiposity in children.³⁸ As in previous HSE reports, children's overweight and obesity prevalence and trends have been produced using the UK National BMI centiles classification.^{39,40} This classification was used to produce obesity trend estimates in the Chief Medical Officer's 2002 Annual Report.⁴¹

Different growth patterns among boys and girls at each age means that a universal categorisation cannot be used to define childhood overweight and obesity. Overweight and obesity prevalence for children aged 2-15 is therefore estimated using the exact age (categorised in 6 month bands) and the sex-specific UK National BMI centiles classification.^{42,43} This classification gives the BMI threshold for each age above which a child is considered overweight or obese. The classification estimates were produced by calculating the proportion of boys and girls who were at or above the 85th (overweight) or 95th (obese) BMI centiles of the 1990 reference population.

11.3 BMI and prevalence of obesity and overweight

11.3.1 BMI, obesity and overweight, by age and sex

Mean BMI was higher overall among girls than boys aged 2-15 (18.4kg/m² and 18.1kg/m² respectively, a difference of 0.3kg/m²). As Figure 11A shows, BMI increased with age in both sexes. Mean BMI ranged from 16.5kg/m² for boys and 16.4kg/m² for girls aged 2-4 to 20.9kg/m² for boys and 21.9kg/m² for girls aged 13-15.



14% of both boys and girls aged 2-15 were classed as obese, and 28% of boys and girls were classed as either overweight or obese; the differences between the sexes were not statistically significant.

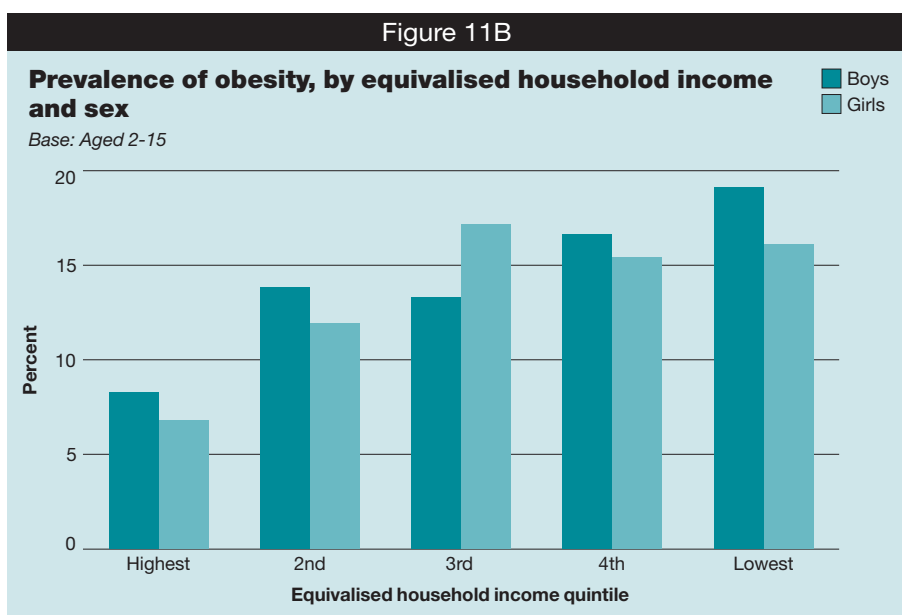
Table 11A below summarises the proportions within the two broad age groups. Children aged 11-15 were more likely than those aged 2-10 to be obese, or overweight including obese. 19% of both boys and girls aged 11-15 were obese, compared with 11% and 10% respectively aged 2-10. Similarly, 34% of boys and 37% of girls aged 11-15 were overweight including obese, compared with 24% and 23% respectively for children aged 2-10.

Tables 11.1, 11.2, 11A

11.3.2 BMI, obesity and overweight prevalence, by equivalised household income

Among children aged 2-15, there was significant variation in the proportion who were obese according to equivalised household income, as shown in Figure 11B. Boys in the lowest quintile were most likely to be obese (19%), whereas obesity was most prevalent among

Table 11A			
Overweight and obesity prevalence, by age and sex			
	Age group		Total
	2-10	11-15	2-15
	%	%	%
Boys			
Overweight	13	15	14
Obese	11	19	14
<i>Overweight including obese</i>	24	34	28
Girls			
Overweight	12	18	15
Obese	10	19	14
<i>Overweight including obese</i>	23	37	28



girls in the lowest three income quintiles (15% to 17%). Boys and girls in the highest income quintile were least likely to be obese (8% and 7% respectively).

There was no similar variation for mean BMI.

Table 11.3, Figure 11B

11.3.3 BMI, obesity and overweight prevalence, by Index of Multiple Deprivation (IMD)

The impact of area deprivation was examined by looking at mean BMI and obesity prevalence by quintiles of the Index of Multiple Deprivation (IMD). Levels of obesity were highest for both boys and girls in the two most deprived quintiles (16% to 19%, compared with 9% to 14% in higher quintiles).

There were no equivalent significant variations by IMD quintiles in mean BMI.

Table 11.4

11.4 Child and parent perceptions of weight

11.4.1 Child perceptions of their own weight

In the self completion booklet, children aged 8-15 were asked about their perception of their own weight. Parents of children aged under 16 were also asked about their perceptions of their child's weight in a self-completion booklet.

As Table 11B shows, 61% of boys and 54% of girls aged 8-15 thought that they were about the right weight. 11% of boys and 15% of girls thought they were too heavy, while 8% of boys and 4% of girls thought they were too light. A substantial proportion of children were not sure whether they were about the right weight (19% of boys and 26% of girls). There was a difference between boys and girls in different age groups who thought they were about the right weight. Boys and girls aged 8-10 were more likely to think that they were about the right weight (66% and 60% respectively) compared with those in the older age group (59% and 51% respectively).

Table 11B			
Child's perception of own weight, by age and sex			
	Age group		Total
	8-10	11-15	8-15
	%	%	%
Boys			
About the right weight	66	59	61
Too heavy	5	14	11
Too light	7	9	8
Don't know	22	18	19
Girls			
About the right weight	60	51	54
Too heavy	9	18	15
Too light	4	4	4
Don't know	27	26	26

The mean BMI of children aged 8-15 who thought they were about the right weight was 18.6kg/m², compared with 24.8kg/m² for those who thought they were too heavy. The majority of children who thought they were too heavy were obese (65%) while 21% were overweight. Just over a fifth of children who thought that they were about the right weight were overweight or obese (15% and 7% respectively). Looking at the data from a different perspective, the majority of children aged 8-15 with a normal BMI value thought they were about the right weight (69% for boys and 62% for girls). However, 65% of boys and 52% of girls who were overweight thought that they were about the right weight, as did 23% of boys and 22% of girls who were obese. This pattern is comparable with the findings from the HSE 2011,⁴⁴ and continues to suggest a lack of awareness of a weight problem among many children of this age.

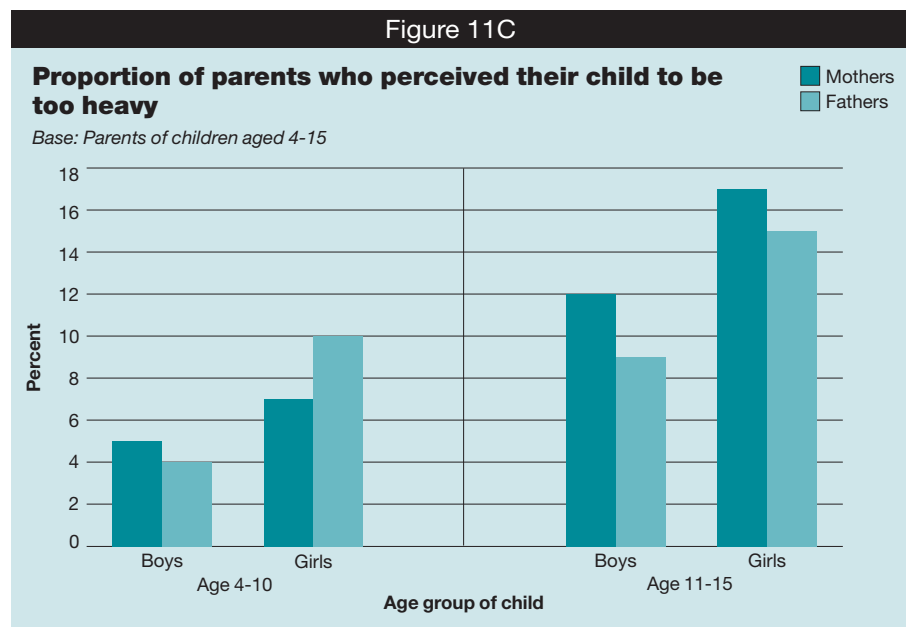
Tables 11.5, 11.6, 11B

11.4.2 Parent perceptions of their child's weight

Table 11.7 shows parent perceptions of their child's weight, with results separately for mothers and fathers. The majority of both mothers and fathers of children aged 4-15 thought that their child was about the right weight (83% of mothers, 85% of fathers for boys, and 83% and 79% respectively for girls). Few parents of children in this age group thought that their child was too heavy (8% of mothers and 6% of fathers for boys, and 11% and 12% respectively for girls). Perceptions varied significantly between older and younger children, with a higher proportion of both parents likely to think children aged 11-15 were too heavy than children aged 4-10, as shown in Figure 11C.

Table 11.8 shows mean BMI and prevalence of obesity by mothers' and fathers' perceptions of their child's weight for all children aged 4-15. In cases where mothers and fathers thought that their child was about the right weight, the mean BMI of the children was 17.8kg/m². However, the mean BMI when fathers judged their child as too heavy was lower than for mothers (23.6kg/m² for fathers and 24.7kg/m² for mothers). In the majority of cases where parents thought their child was too heavy, the child was in fact overweight or obese (93% for mothers and 84% for fathers). Most parents who thought their child was about the

Figure 11C



right weight were correct; however, just under a quarter had a child who was overweight or obese (23% among both mothers and fathers who thought their child’s weight was ‘about right’).

Table 11.9 is directly comparable to Table 11.8 but for the 8-15 age group, with results therefore for the same age group as for children’s own perceptions in Table 11.6. The patterns in mothers’ and fathers’ perceptions of their child’s weight were similar to those for the 4-15 age group. In cases where mothers and fathers thought that their child was about the right weight, the mean BMI was 18.6kg/m² and 18.7kg/m² respectively. As with the 4-15 age group, the mean BMI at which fathers of children aged 8-15 judged their child as too heavy was lower than for mothers (24.6kg/m² and 25.4kg/m² respectively). Again almost identically to the wider age group, 24% of mothers and 23% of fathers who thought their child was about the right weight, in fact had a child who was overweight or obese.

Tables 11.7-11.9, Figure 11C

11.4.3 Children trying to change weight

Tables 11.10 and 11.11 show the proportion of children aged 8-15 who reported that they were trying to change their weight. The majority of children were not trying to change their weight (68% of boys and 66% of girls). Fewer boys than girls said they were trying to lose weight (21% and 32% respectively), and trying to lose weight was more common among older children for both sexes (24% of boys, 39% of girls aged 11-15, compared with 13% and 19% respectively aged 8-10).

The mean BMI of children trying to lose weight was 23.3kg/m², compared with 16.7 kg/m² for those trying to gain weight and 18.3kg/m² for those who were not trying to change their weight. Among those who were trying to lose weight 26% were overweight and 48% were obese, while 26% were neither overweight nor obese. Looking at the data from another perspective, 25% of children aged 8-15 who were obese were not trying to change their weight, and neither were 50% of those who were overweight.

Tables 11.10, 11.11

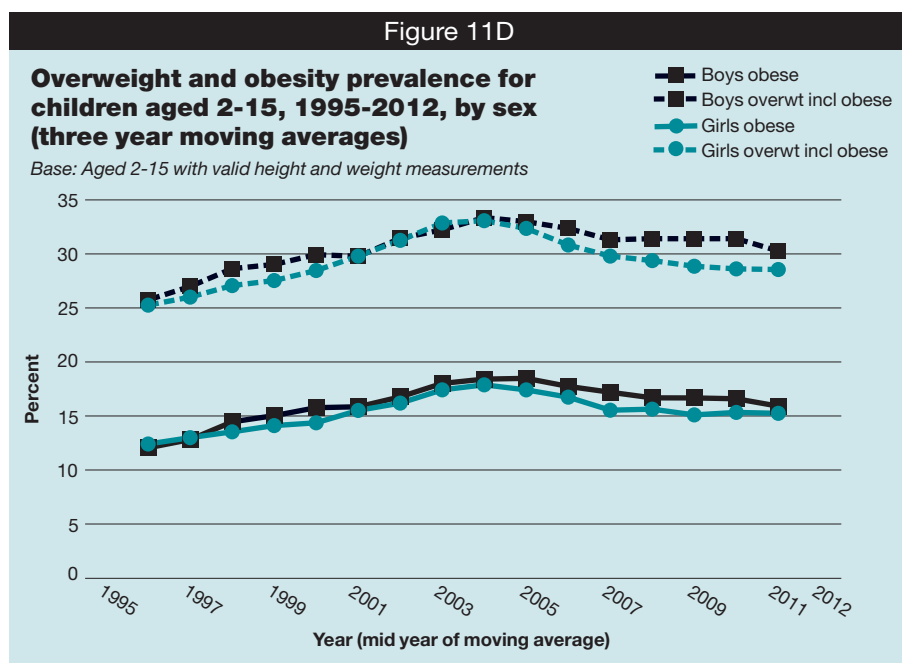
11.5 Trends in BMI, overweight and obesity

Tables 11.12 to 11.14 show trends in mean BMI and the prevalence of overweight and obesity between 1995 and 2012. The tables present trend data for children aged 2-15 and then for the age groups 2-10 and 11-15 separately.

Mean BMI increased between 1995 and 2012 by 0.4kg/m² among boys aged 2-15 (from 17.7kg/m² to 18.1kg/m²), and by 0.3kg/m² for girls (from 18.1kg/m² to 18.4kg/m²). With fluctuations from year to year, overall increases in mean BMI were evident for both sexes

during this period, although for the last few years mean BMI has been slightly lower than the peak around 2004/2005.

It has been well documented that childhood obesity in the UK has increased significantly since 1995, when 11% of boys and 12% of girls were obese. The prevalence of obesity increased steadily in most years up to around 2004 and 2005, where it peaked at 18% to 19% among both boys and girls. Levels have been slightly lower than this peak in the last few years, with 17% of boys and 16% of girls obese in 2011. The levels in 2012, at 14% for both boys and girls, were lower than in 2011 though not statistically significantly so; bases for the last two years are smaller in the absence of a child boost, and margins of error are therefore wider. It will be important to continue to monitor the trends in future, using HSE data to confirm whether this is the beginning of a gradual downward shift or simply fluctuation in the flattening trend. Figure 11D shows three-year moving averages from 1995 to 2012 for children aged 2-15 who were obese, and overweight including obese.



The proportion of children who were overweight varied less over the period than the proportion who were obese. While there has been a slight increase overall, there have been fluctuations from year to year. Thus changes in the proportion who were overweight including obese have closely followed the pattern of changes in the proportion who were obese. As well as differences between boys and girls highlighted above, there were differences in trends according to age. Figure 11E shows, for the period from 1995 to 2012, the proportion of children aged 2-10 and 11-15 who were obese. Among both age groups and both sexes, there was a similar pattern of increase up to the peak around 2004/2005; since then the proportion who were obese in the 11-15 age group has remained at a broadly similar level (with some fluctuation) among both boys and girls. Among those aged 2-10 the proportion who were obese has decreased from 17% of both boys and girls in 2005 to 11% of boys and 10% of girls in 2012.

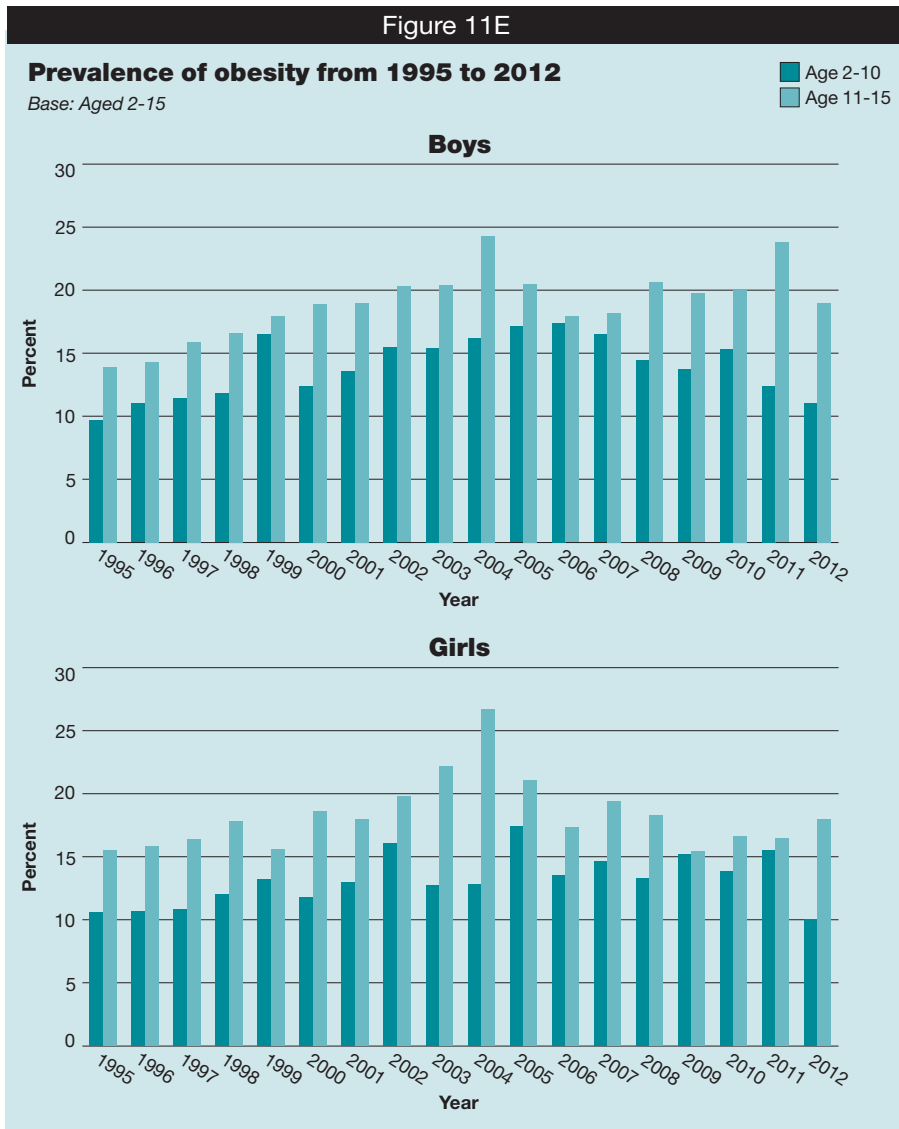
Tables 11.12-11.14, Figures 11D, 11E

11.6 Discussion

The findings presented in this chapter showed similar overall BMI for boys and girls aged 2-15. Mean BMI varied across age groups, being lower among younger children and increasing in older children. Consistent with previous years, children aged 11-15 were more likely to be overweight or obese than younger children aged 2-10.

As with previous HSE findings, inequalities in obesity prevalence were evident by equalised household income for children. For boys, prevalence of obesity was higher in

Figure 11E



the lowest income quintile and for girls in the lowest three income quintiles. This reflects the pattern among adults (see Chapter 10), with prevalence of obesity being higher in the lowest two income quintiles for both men and women. In 2012, obesity prevalence was also generally higher among children living in the more deprived areas of England. This disparity between higher and lower income families is a recognised issue amongst policy makers and has been acknowledged by the government’s white paper *A Call to Action on Obesity in England*,¹⁰ which set out to focus on combating the health of the poorest as a matter of most immediate concern.

Trends over time show that there has been little significant change in the levels of obesity over the last few years among children aged 11-15, after steady increase between 1995 and the early 2000s. However, there has been a significant decrease in the proportion of children aged 2-10 that were obese, from 17% of both boys and girls in 2005 to 11% of boys and 10% of girls in 2012. Nevertheless, there remained a substantial proportion of children aged 8-15 who misjudged their weight, considering themselves to be about the right weight when in fact they were overweight or obese. Correspondingly, a quarter of children were neither overweight nor obese but reported that they were trying to lose weight. These findings point towards the need for increased awareness and understanding of what a healthy weight is. Initiatives such as Healthy Schools Programme⁴⁵ which includes a toolkit to help schools deliver information about health and healthy lifestyles, may play an important role in providing information on healthy choices to children.

Just as it is important for a child to be accurate in perceiving their own weight, accuracy among parents is similarly important, since they play an essential part in guiding their child’s behaviours and attitudes towards healthy weight management.^{29,31} According to previous

studies,^{31,46} parents of overweight and obese children often do not accurately perceive their child's weight status. For the second time, in 2012 parents were asked about their perceptions of their child's weight. As in 2011, just over a fifth of parents of overweight or obese children aged 4-15 reported that their child was about the right weight. There was slight variation between the perceptions of mothers and fathers, according to the age and sex of their child. Although base sizes in the HSE 2012 are not large enough to detect different patterns between boys and girls, findings from previous studies have indicated that parents of obese and overweight boys were more likely to perceive their child's weight status inaccurately than parents of obese or overweight girls.^{47,48} Information and guidance for parents is needed to improve understanding and lead to more accurate perceptions of their children's needs; campaigns such as Change4Life,⁹ which provides parents with information about healthy eating and the importance of physical activity, can play a role in this.

References and notes

- 1 Foresight. *Tackling Obesities: Future Choices – Project report*; Government Office for Science, 2007. http://webarchive.nationalarchives.gov.uk/+/www.dh.gov.uk/en/Publichealth/Healthimprovement/Obesity/DH_079713
- 2 McPherson K, Brown M, Marsh T, Byatt T. *Obesity: Recent Trends in Children Aged 2-11y and 12-19y. Analysis from the Health Survey for England 1993 – 2007*. National Heart Forum, 2009. http://nhfshare.heartforum.org.uk/RMAssets/NHFReports/Child_Obesity_short_Oct_09.pdf
- 3 Health and Social Care Information Centre. *National Child Measurement Programme: England, 2011/12 school year*. HSCIC, Leeds, 2012. www.hscic.gov.uk/catalogue/PUB09283
- 4 Department of Health. *Choosing Health: Making Healthier Choices Easier*. HMSO, London, 2004.
- 5 Department of Health. *Healthy Lives, Healthy People: Our Strategy for Public Health in England*. HMSO, London, 2010. www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_121941
- 6 *Healthy Child Programme: from 5 to 19 years old*. Department of Health, 2009. http://webarchive.nationalarchives.gov.uk/20130107105354/http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_107566
- 7 Health and Social Care Information Centre. *National Child Measurement Programme*. HSCIC, Leeds, 2010. <http://www.hscic.gov.uk/ncmp>
- 8 *Public Health Responsibility Deal*. Department of Health, 2011. <https://responsibilitydeal.dh.gov.uk/>
- 9 *Change4Life*. Department of Health, 2009. www.nhs.uk/Change4Life
- 10 Department of Health. *Healthy Lives, Healthy People: A call to action on obesity in England*. HMSO, London, October 2011.
- 11 Barlow S, Dietz WH. *Obesity evaluation and treatment: expert committee recommendations*. *Paediatrics* 1998;**102**:E29.
- 12 Taylor RW, Jones IE, Williams SM, Goulding A. *Body fat percentages measured by dual-energy X-ray absorptiometry corresponding to recently recommended body mass index cutoffs for overweight and obesity in children and adolescents aged 3-18y*. *American Journal of Clinical Nutrition* 2002;**76**:1416-1421.
- 13 Steinbeck K. *The importance of physical activity in the prevention of overweight and obesity in childhood: a review and an opinion*. *Obesity Reviews* 2001;**2**:117-130.
- 14 Greater London Authority. *Childhood obesity in London, 2011*. www.london.gov.uk/sites/default/files/glac-childhood-obesity.pdf
- 15 Lew EA, Garfinkel L. *Variations in mortality by weight among 750,000 men and women*. *Journal of Chronic Disease* 1978;**32**:563-565.
- 16 Rhoads GG, Kagan A. *The relation of coronary-disease, stroke, and mortality to weight in youth and in middle-age*. *Lancet* 1983;**1**:492-495.
- 17 Gunnell D, Frankel S, Nanchahal K, Peters TJ, Smith GD. *Childhood obesity and adult cardiovascular mortality: a 57-y follow-up study based on the Boyd Orr cohort*. *American Journal of Clinical Nutrition* 1998;**67**:1111-18.
- 18 Must A, Jacques PF, Dallal GE, Bajema CJ, Dietz WH. *Long-term morbidity and mortality of overweight adolescents – a follow-up of the Harvard growth study of 1922 to 1935*. *New England Journal of Medicine* 1992;**327**:1350-55.

- 19 Engeland A, Bjorge T, Sogaard AJ, Tverdal A. *Body mass index in adolescence in relation to total mortality: 32-year follow-up of 227,000 Norwegian boys and girls*. American Journal of Epidemiology 2003;**157**:517-523.
- 20 Freedman D, Dietz WH, Srinivasan S, Berenson GS. *The relation of overweight to cardiovascular risk factors among children and adolescents: The Bogalusa Heart Study*. Pediatrics, 1999;**103**:1175-1182.
- 21 von Mutius E, Schwartz J, Neas LM, Dockery D, Weiss ST. *Relation of body mass index to asthma and atopy in children: the National Health and Nutrition Examination Study III*. Thorax 2001;**56**:835-838.
- 22 Fagot-Campagna A, Pettitt DJ, Engelgau MM, Burrows NR et al. *Type 2 diabetes among North American children and adolescents: an epidemiological review and a public health perspective*. Journal of Pediatrics 2000;**136**:664-672.
- 23 Braet C, Wydhooge K. *Dietary restraint in normal weight and overweight children. A cross-sectional study*. International Journal of Obesity 2000;**24**:314-318.
- 24 Hill AJ, Draper E, Stack J. *A weight on children's minds: body shape dissatisfactions at 9-years old*. International Journal of Obesity 1994;**18**:383-389.
- 25 Gustafson-Larson AM, Terry RD. *Weight-related behaviours and concerns of fourth-grade children*. Journal of American Dietetic Association 1992;**92**:818-822.
- 26 Cornette R. *The emotional impact of obesity on children*. Worldviews on Evidence-Based Nursing 2008;**5**(3):136-41.
- 27 Sjoberg RL. *Obesity, Shame, and Depression in School-Aged Children: A Population-Based Study*. Paediatrics 2005;**116**(3):389-92.
- 28 Ball K, Burton NW, Brown WJ. *A prospective study of overweight, physical activity, and depressive symptoms in young women*. Obesity 2009;**17**:66-71.
- 29 Dietz, W.H., & Gortmaker, S.L. *Preventing obesity in children and adolescents*. Annual Review of Public Health 2001;**22**:337-353.
- 30 Johannsen, D. L., Johannsen, N. M. and Specker, B. L. *Influence of Parents' Eating Behaviors and Child Feeding Practices on Children's Weight Status*. Obesity 2006;**14**:431-439.
- 31 Carnell S, Edwards C, Croker H et al. *Parental perceptions of overweight in 3-5y olds*. International Journal of Obesity 2005;**29**:353-355.
- 32 Baughcum AE, Chamberlin LA, Deeks CM, Powers SW, Whittaker RC. *Maternal perceptions of overweight preschool children*. Paediatrics 2000;**106**:1380-1386.
- 33 www.hscic.gov.uk/pubs/hse2012trend
- 34 Russell-Aulet M, Wang J, Thornton J, Pierson RN. *Comparison of Dual-Photon Absorptiometry systems for total-body bone and soft-tissue measurements: dual-energy X-rays versus Gd-153*. Journal of Bone and Mineral Research 1991;**6**:411-415.
- 35 Fernandez JR, Heo M, Heymsfield SB et al. *Is percentage body fat differentially related to body mass index in Hispanic Americans, African Americans, and European Americans?* American Journal of Clinical Nutrition 2003;**77**:71-75.
- 36 Lindsay RS, Hanson RL, Roumain J, Ravussin E, Knowler WC, Tataranni PA. *Body mass index as a measure of adiposity in children and adolescents: relationship to adiposity by dual energy X-ray absorptiometry and to cardiovascular risk factors*. The Journal of Clinical Endocrinology and Metabolism 2001;**86**:4061-67.
- 37 Pietrobelli A, Faith MS, Allison DB, Gallagher D, Chiumello G, Heymsfield SB. *Body mass index as a measure of adiposity among children and adolescents: a validation study*. Journal of Pediatrics 1998;**132**:204-210.
- 38 Bellizzi MC, Dietz WH. *Workshop on childhood obesity: summary of the discussion*. American Journal of Clinical Nutrition 1999;**70**:173S-175.
- 39 Cole TJ, Freeman JV, Preece MA. *Body mass index reference curves for the UK, 1990*. Archives of Disease in Childhood 1995;**73**:25-29.
- 40 Scholes S, Heeks F. *BMI, overweight and obesity* (Chapter 2) in Craig R, Mindell J (eds). *Health Survey for England 2006. Volume 2: Obesity and other risk factors in children*. Health and Social Care Information Centre, Leeds, 2008. <http://www.hscic.gov.uk/pubs/hse06cvdandriskfactors>
- 41 Chief Medical Officer of England. *Annual Report 2002*. Department of Health, London, 2003.
- 42 There is no generally agreed definition of childhood obesity, but there are two widely used indicators: the International Classification, based on reference points derived from an international survey; and the National Body Mass Index centile classification, based on the UK 1990 reference curves (as used in this report). Although the figures produced by the two different definitions differ considerably (obesity estimates derived using the National Body Mass Index centile classification are much higher than those derived by the international classification), the overall trends are not affected by the definition used.
- 43 Stamatakis E. *Anthropometric measures, overweight, and obesity*. Chapter 9 in Sproston K, Primates P (eds). *Health Survey for England 2002*. The Stationery Office, London, 2003.

- 44 Mandalia D. *Children's BMI, overweight and obesity*, Chapter 11 in Craig R, Mindell J (eds). *Health Survey for England 2011*. Health and Social Care Information Centre, Leeds, 2012.
<http://www.hscic.gov.uk/catalogue/PUB09300>
- 45 Healthy Schools Programme. www.education.gov.uk/a0075278/healthy-schools
- 46 Huang JS, Donohue, M, Becerra K, Xu R. *Relationship between parents' and children's weight perceptions. Results of a survey*. *Infant, Child & Adolescent Nutrition* 2009;**1**(1);15-20.
- 47 Jeffery AN, Voss LD, Metcalf BS, Alba S, Wilkin TJ. *Parents' awareness of overweight in themselves and their children: cross sectional study within a cohort (EarlyBird 21)*. *BMJ* 2005;**330**;23-24.
- 48 O La De A, Jordan CK, Ortiz K et al. *Do parents accurately perceive their child's weight status?* *Journal of Paediatric Health Care* 2009;**23**(4);216-221.

Tables

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Notes on the tables

1. The group on which the figures in the table are based is stated at the upper left corner of the table.
2. The data in most tables have been weighted. See Volume 2, Chapter 7, of this report for more detail. Both unweighted and weighted sample sizes are shown at the foot of each table.
3. Apart from tables showing age breakdowns, data have been age-standardised to allow comparisons between groups after adjusting for the effects of any differences in their age distributions. See Volume 2, Chapter 8.4, of this report for more detail.
4. The following conventions have been used in tables:
 - no observations (zero value)
 - 0 non-zero values of less than 0.5% and thus rounded to zero
 - [] used to warn of small sample bases, if the unweighted base is less than 50. If a group's unweighted base is less than 30, data are normally not shown for that group.
5. Because of rounding, row or column percentages may not add exactly to 100%.
6. 'Missing values' occur for several reasons, including refusal or inability to answer a particular question; refusal to co-operate in an entire section of the survey (such as the nurse visit or a self-completion questionnaire); and cases where the question is not applicable to the participant. In general, missing values have been omitted from all tables and analyses.

Table 11.1

BMI, by age and sex						
<i>Aged 2-15 with valid height and weight measurements</i>						<i>2012</i>
BMI (kg/m²)	Age group					Total
	2-4	5-7	8-10	11-12	13-15	
Boys						
Mean	16.5	16.4	17.1	19.3	20.9	18.1
Standard error of the mean	0.14	0.18	0.23	0.41	0.36	0.16
5th centile ^a	14.5	14.0	13.9	14.8	15.8	14.3
10th centile	14.8	14.5	14.4	15.1	16.9	14.8
15th centile	15.1	14.8	14.7	15.5	17.3	15.1
Median	16.3	15.9	16.4	18.5	20.0	17.1
85th centile	18.0	17.9	19.5	23.8	24.8	21.4
90th centile	18.5	18.4	20.5	24.8	26.5	23.1
95th centile	19.1	19.4	23.4	26.1	29.5	24.9
Girls						
Mean	16.4	16.4	17.6	19.6	21.9	18.4
Standard error of the mean	0.16	0.20	0.26	0.35	0.36	0.17
5th centile ^a	14.1	13.9	14.0	15.0	16.8	14.2
10th centile	14.7	14.1	14.5	15.9	17.3	14.8
15th centile	14.9	14.3	14.9	16.2	18.6	15.1
Median	16.1	16.1	16.8	19.2	21.0	17.3
85th centile	18.0	18.3	20.6	23.7	25.2	21.9
90th centile	18.3	19.2	22.3	24.0	26.2	23.3
95th centile	19.3	20.1	23.1	25.1	30.0	25.1
<i>Bases (unweighted)</i>						
<i>Boys</i>	<i>134</i>	<i>149</i>	<i>149</i>	<i>100</i>	<i>132</i>	<i>664</i>
<i>Girls</i>	<i>139</i>	<i>134</i>	<i>151</i>	<i>111</i>	<i>122</i>	<i>657</i>
<i>Bases (weighted)</i>						
<i>Boys</i>	<i>121</i>	<i>142</i>	<i>152</i>	<i>103</i>	<i>163</i>	<i>680</i>
<i>Girls</i>	<i>131</i>	<i>130</i>	<i>133</i>	<i>111</i>	<i>137</i>	<i>642</i>

^a Centiles are values of a distribution that divide it into 100 equal parts. For example, the 5th centile is the value of a distribution where 5% of the cases have values at or below the 5th centile and 95% have values above it. The 50th centile is the median.

Table 11.2

Overweight and obesity prevalence, by age and sex

Aged 2-15 with valid height and weight measurements 2012

BMI status	Age group					Total
	2-4	5-7	8-10	11-12	13-15	
	%	%	%	%	%	%
Boys						
Overweight ^{a,b}	12	14	13	16	14	14
Obese ^{a,b}	10	12	11	20	18	14
<i>Overweight including obese</i>	22	26	24	36	33	28
Girls						
Overweight ^{a,b}	13	15	10	19	17	15
Obese ^{a,b}	8	9	14	15	22	14
<i>Overweight including obese</i>	21	23	24	35	38	28
<i>Bases (unweighted)</i>						
Boys	134	149	149	100	132	664
Girls	139	134	151	111	122	657
<i>Bases (weighted)</i>						
Boys	121	142	152	103	163	680
Girls	131	130	133	111	136	642

^a Categories are mutually exclusive, i.e. overweight does not include those who are obese.

^b Overweight was defined as at or above the 85th but below the 95th UK National BMI centile; obese was defined as at or above the 95th UK National BMI centile.

Table 11.3

BMI, overweight and obesity prevalence, by equivalised household income and sex

Aged 2-15 with valid height and weight measurements 2012

BMI (kg/m ²) and BMI status	Equivalised household income quintile				
	Highest	2nd	3rd	4th	Lowest
Boys					
Mean BMI	18.0	18.0	18.1	18.0	18.5
Standard error of the mean	0.31	0.33	0.35	0.35	0.52
Median BMI	17.0	17.5	17.2	16.6	17.1
% overweight ^{a,b}	14	19	15	11	12
% obese ^{a,b}	8	14	13	17	19
<i>% overweight including obese</i>	22	33	29	27	32
Girls					
Mean BMI	18.2	18.4	18.7	18.7	18.2
Standard error of the mean	0.37	0.43	0.42	0.38	0.28
Median BMI	17.0	16.7	18.1	17.5	17.5
% overweight ^{a,b}	24	8	16	14	9
% obese ^{a,b}	7	12	17	15	16
<i>% overweight including obese</i>	31	20	34	29	25
<i>Bases (unweighted)</i>					
Boys	97	133	112	132	112
Girls	85	111	98	142	135
<i>Bases (weighted)</i>					
Boys	105	132	111	133	116
Girls	85	104	91	138	127

^a Categories are mutually exclusive, i.e. overweight does not include those who are obese.

^b Overweight was defined as at or above the 85th but below the 95th UK National BMI centile; obese was defined as at or above the 95th UK National BMI centile.

Table 11.4

BMI (kg/m ²) and BMI status	IMD quintile				
	Least deprived	2nd	3rd	4th	Most deprived
Boys					
Mean BMI	18.0	17.8	18.0	18.0	18.6
Standard error of the mean	0.30	0.30	0.33	0.36	0.43
Median BMI	17.1	17.0	17.0	17.0	17.3
% overweight ^{b,c}	14	12	13	16	14
% obese ^{b,c}	14	11	10	16	19
% overweight including obese	28	23	24	32	33
Girls					
Mean BMI	18.1	18.7	18.3	18.4	18.4
Standard error of the mean	0.33	0.42	0.36	0.39	0.34
Median BMI	17.2	17.2	17.6	17.3	17.6
% overweight ^{b,c}	17	14	20	11	11
% obese ^{b,c}	9	12	11	19	16
% overweight including obese	26	27	32	30	27
<i>Bases (unweighted)</i>					
Boys	158	123	120	151	112
Girls	129	137	125	134	132
<i>Bases (weighted)</i>					
Boys	163	127	124	150	115
Girls	127	131	122	131	131

^a The Index of Multiple Deprivation 2010 (IMD) combines a number of indicators, chosen to cover a range of economic, social and housing issues, into a single deprivation score at the small area level in England.

^b Categories are mutually exclusive, i.e. overweight does not include those who are obese.

^c Overweight was defined as at or above the 85th but below the 95th UK National BMI centile; obese was defined as at or above the 95th UK National BMI centile.

Table 11.5

Child's perception of own weight	Age group		Total
	8-10	11-15	
<i>Aged 8-15</i>			
Boys			
About the right weight	66	59	61
Too heavy	5	14	11
Too light	7	9	8
Don't know	22	18	19
Girls			
About the right weight	60	51	54
Too heavy	9	18	15
Too light	4	4	4
Don't know	27	26	26
<i>Bases (unweighted)</i>			
Boys	148	244	392
Girls	158	244	402
<i>Bases (weighted)</i>			
Boys	147	279	427
Girls	139	259	398

Table 11.6

BMI, overweight and obesity prevalence, by child's perception of own weight

Aged 8-15 with valid height and weight measurements 2012

BMI (kg/m ²) and BMI status	Child's perception of own weight		
	About the right weight	Too heavy	Too light
Mean BMI	18.6	24.8	[16.2]
Standard error of the mean	0.16	0.52	[0.29]
Median BMI	18.4	24.4	[16.0]
% neither overweight or obese	79	14	[100]
% overweight ^{a,b}	15	21	[-]
% obese ^{a,b}	7	65	[-]
% overweight including obese	21	86	[-]
<i>Bases (unweighted)</i>	408	92	47
<i>Bases (weighted)</i>	426	97	49

^a Categories are mutually exclusive, i.e. overweight does not include those who are obese.

^b Overweight was defined as at or above the 85th but below the 95th UK National BMI centile; obese was defined as at or above the 95th UK National BMI centile.

[] Results in brackets should be treated with caution because of the small base size.

Table 11.7

Parent perception of child's weight, by child's age and sex

Parents of children aged 4-15 2012

Parent perception of child's weight	Mother's perception		Total	Father's perception		Total
	Child's age group			Child's age group		
	4-10	11-15	4-10	11-15	%	%
	%	%	%	%	%	%
Boys						
About the right weight	88	76	83	88	80	85
Too heavy	5	12	8	4	9	6
Too light	7	12	9	8	11	9
Girls						
About the right weight	86	79	83	80	79	79
Too heavy	7	17	11	10	15	12
Too light	7	5	6	10	6	9
<i>Bases (unweighted)</i>						
<i>Boys</i>	312	183	495	185	105	290
<i>Girls</i>	293	184	477	181	125	306
<i>Bases (weighted)</i>						
<i>Boys</i>	293	207	501	170	104	274
<i>Girls</i>	269	192	461	165	112	277

Table 11.8

BMI, overweight and obesity prevalence, by parent perception of child's weight, children aged 4-15

Parents of children aged 4-15 with valid height and weight measurements 2012

BMI (kg/m ²) and BMI status	Mother's perception			Father's perception		
	About the right weight	Too heavy	Too light	About the right weight	Too heavy	Too light
Mean BMI	17.8	24.7	15.9	17.8	[23.6]	[15.8]
Standard error of the mean	0.13	0.49	0.28	0.17	[0.68]	[0.24]
Median BMI	17.1	24.1	15.5	17.1	[23.1]	[15.6]
% neither overweight or obese	77	7	100	77	[16]	[100]
% overweight ^{a,b}	15	16	-	15	[16]	[-]
% obese ^{a,b}	8	77	-	8	[68]	[-]
% overweight including obese	23	93	-	23	[84]	[-]
<i>Bases (unweighted)</i>	672	82	56	406	45	47
<i>Bases (weighted)</i>	667	80	59	419	47	50

^a Categories are mutually exclusive, i.e. overweight does not include those who are obese.

^b Overweight was defined as at or above the 85th but below the 95th UK National BMI centile; obese was defined as at or above the 95th UK National BMI centile.

[] Results in brackets should be treated with caution because of the small base size.

Table 11.9

BMI, overweight and obesity prevalence, by parent perception of child's weight, children aged 8-15

Parents of children aged 8-15 with valid height and weight measurements 2012

BMI (kg/m ²) and BMI status	Mother's perception			Father's perception		
	About the right weight	Too heavy	Too light	About the right weight	Too heavy	Too light
Mean BMI	18.6	25.4	[16.3]	18.7	[24.6]	[16.1]
Standard error of the mean	0.17	0.56	[0.33]	0.21	[0.76]	[0.30]
Median BMI	18.1	24.5	[16.1]	18.3	[24.8]	[15.9]
% neither overweight or obese	76	8	[100]	77	[16]	[100]
% overweight ^{a,b}	15	15	[-]	15	[15]	[-]
% obese ^{a,b}	9	78	[-]	8	[69]	[-]
% overweight including obese	24	92	[-]	23	[84]	[-]
Bases (unweighted)	428	67	39	252	34	33
Bases (weighted)	439	67	43	269	36	36

^a Categories are mutually exclusive, i.e. overweight does not include those who are obese.

^b Overweight was defined as at or above the 85th but below the 95th UK National BMI centile; obese was defined as at or above the 95th UK National BMI centile.

[] Results in brackets should be treated with caution because of the small base size.

Table 11.10

Desire to change weight, by age and sex

Aged 8-15 2012

Desire to change weight	Age group		Total
	8-10	11-15	
	%	%	%
Boys			
Not trying to change weight	76	65	68
Trying to lose weight	13	24	21
Trying to gain weight	11	11	11
Girls			
Not trying to change weight	78	59	66
Trying to lose weight	19	39	32
Trying to gain weight	3	2	3
Bases (unweighted)			
Boys	147	244	391
Girls	157	243	400
Bases (weighted)			
Boys	147	279	426
Girls	138	258	395

Table 11.11

BMI, overweight and obesity prevalence, by desire to change weight

Aged 8-15 with valid height and weight measurements 2012

BMI (kg/m ²) and BMI status	Desire to change weight		
	Not trying to change	Trying to lose weight	Trying to gain weight
Mean BMI	18.3	23.3	[16.7]
Standard error of the mean	0.15	0.31	[0.35]
Median BMI	17.8	23.0	[16.3]
% neither overweight or obese	83	26	[97]
% overweight ^{a,b}	11	26	[3]
% obese ^{a,b}	7	48	[-]
% overweight including obese	17	74	[3]
Bases (unweighted)			
	469	196	49
Bases (weighted)			
	489	199	53

^a Categories are mutually exclusive, i.e. overweight does not include those who are obese.

^b Overweight was defined as at or above the 85th but below the 95th UK National BMI centile; obese was defined as at or above the 95th UK National BMI centile.

[] Results in brackets should be treated with caution because of the small base size.

Table 11.12

Trends in BMI, overweight and obesity prevalence among children aged 2-15, 1995-2012, by sex

Aged 2-15 with valid height and weight measurements

1995-2012

BMI (kg/m ²) and BMI status	Survey year																	
	1995	1996	1997	1998	1999	2000	2001	2002	2003 ^a	2004	2005	2006	2007	2008	2009	2010	2011	2012
Boys																		
Mean	17.7	17.7	17.8	17.9	18.2	18.0	18.2	18.3	18.5	18.6	18.6	18.4	18.4	18.4	18.3	18.2	18.3	18.1
Standard error of the mean	0.08	0.07	0.06	0.08	0.15	0.14	0.08	0.07	0.12	0.15	0.13	0.07	0.06	0.08	0.09	0.08	0.16	0.16
Median	17.0	17.1	17.0	17.1	17.3	17.0	17.4	17.4	17.5	17.5	17.7	17.5	17.5	17.4	17.5	17.4	17.4	17.1
% Overweight ^{b,c}	13	15	13	15	15	13	15	14	15	14	16	13	14	15	15	14	15	14
% Obese ^{b,c}	11	12	13	13	17	15	16	17	17	19	18	18	17	17	16	17	17	14
% Overweight including obese	24	27	26	28	32	27	31	31	32	33	35	31	31	31	31	31	31	28
Girls																		
Mean	18.1	18.1	18.1	18.4	18.2	18.5	18.6	18.8	18.8	19.3	18.9	18.7	18.7	18.7	18.5	18.3	18.6	18.4
Standard error of the mean	0.09	0.10	0.07	0.10	0.15	0.14	0.10	0.07	0.12	0.20	0.14	0.08	0.08	0.08	0.10	0.09	0.18	0.17
Median	17.3	17.2	17.3	17.4	17.3	17.4	17.6	17.8	17.8	18.1	17.8	17.6	17.7	17.7	17.5	17.4	17.5	17.3
% Overweight ^{b,c}	13	12	13	14	14	13	16	14	15	17	13	14	14	14	13	14	13	15
% Obese ^{b,c}	12	12	13	14	14	14	15	17	16	18	19	15	16	15	15	15	16	14
% Overweight including obese	26	24	26	28	28	27	31	32	32	35	32	29	31	29	28	29	28	28
Bases (unweighted)																		
Boys	1697	1874	3275	1754	857	864	1490	3250	1417	635	1166	3029	3255	3030	1733	2303	678	664
Girls	1672	1758	3288	1657	789	846	1532	3140	1416	578	1191	2950	3090	3068	1607	2219	660	657
Bases (weighted)																		
Boys	1918	2130	3061	1980	977	875	1652	3744	1452	623	1102	2821	2885	2880	1526	2079	687	680
Girls	1901	2012	3068	1872	950	841	1698	3634	1392	581	1091	2668	2792	2740	1464	2033	666	642

^a Data for all years have been weighted to correct for the probability of selection. From 2003, non-response weighting has also been applied.

^b Categories are mutually exclusive, i.e. overweight does not include those who are obese.

^c Overweight was defined as at or above the 85th but below the 95th UK National BMI centile; obese was defined as at or above the 95th UK National BMI centile.

Table 11.13

Trends in BMI, overweight and obesity prevalence among children aged 2-10, 1995-2012, by sex

Aged 2-10 with valid height and weight measurements

1995-2012

BMI (kg/m ²) and BMI status	Survey year																		
	1995	1996	1997	1998	1999	2000	2001	2002	2003 ^a	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Boys																			
Mean	16.7	16.7	16.7	16.9	17.2	16.9	17.0	17.1	17.2	17.2	17.3	17.1	17.2	17.1	17.0	17.0	16.8	16.7	
Standard error of the mean	0.06	0.06	0.05	0.08	0.15	0.10	0.08	0.06	0.12	0.13	0.12	0.07	0.06	0.07	0.08	0.07	0.11	0.11	
Median	16.4	16.4	16.4	16.5	16.6	16.4	16.6	16.6	16.5	16.6	16.7	16.6	16.7	16.5	16.5	16.6	16.5	16.2	
% Overweight ^{b,c}	13	14	13	15	14	14	16	14	15	15	16	12	13	14	16	14	15	13	
% Obese ^{b,c}	10	11	11	12	17	12	14	16	15	16	17	17	16	14	14	15	12	11	
% Overweight including obese	23	25	25	27	31	26	30	29	31	31	34	30	30	28	30	30	27	24	
Girls																			
Mean	16.9	16.8	16.9	17	17	17	17.1	17.3	17.2	17.3	17.4	17.1	17.2	17.2	17.1	16.9	17.0	16.8	
Standard error of the mean	0.08	0.08	0.05	0.07	0.13	0.12	0.09	0.07	0.11	0.14	0.13	0.07	0.07	0.07	0.09	0.08	0.17	0.13	
Median	16.4	16.4	16.5	16.5	16.6	16.4	16.6	16.7	16.6	16.8	16.7	16.5	16.7	16.6	16.5	16.4	16.3	16.3	
% Overweight ^{b,c}	13	11	12	13	14	12	15	14	14	15	13	13	14	13	12	13	9	12	
% Obese ^{b,c}	11	11	11	12	13	12	13	16	13	13	17	14	15	13	15	14	16	10	
% Overweight including obese	23	22	23	25	27	24	27	30	27	28	30	27	29	26	27	27	24	23	
Bases (unweighted)																			
Boys	1113	1234	2159	1185	563	582	913	2036	864	404	707	1875	2006	1863	1086	1466	458	432	
Girls	1114	1178	2222	1082	535	537	980	1948	869	338	731	1845	1921	1909	1020	1453	453	424	
Bases (weighted)																			
Boys	1261	1418	2005	1336	633	570	1035	2364	878	379	664	1737	1766	1762	934	1293	434	415	
Girls	1266	1365	2081	1215	628	523	1094	2290	857	346	674	1635	1746	1701	916	1298	420	394	

^a Data for all years have been weighted to correct for the probability of selection. From 2003, non-response weighting has also been applied.

^b Categories are mutually exclusive, i.e. overweight does not include those who are obese.

^c Overweight was defined as at or above the 85th but below the 95th UK National BMI centile; obese was defined as at or above the 95th UK National BMI centile.

Table 11.14

Trends in BMI, overweight and obesity prevalence among children aged 11-15, 1995-2012, by sex

Aged 11-15 with valid height and weight measurements

1995-2012

BMI (kg/m ²) and BMI status	Survey year																		
	1995	1996	1997	1998	1999	2000	2001	2002	2003 ^a	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Boys																			
Mean	19.7	19.7	19.7	19.9	20.1	19.9	20.1	20.3	20.5	20.8	20.5	20.3	20.2	20.5	20.3	20.3	21.0	20.2	
Standard error of the mean	0.15	0.16	0.11	0.15	0.24	0.24	0.16	0.12	0.19	0.27	0.23	0.12	0.11	0.12	0.15	0.14	0.29	0.29	
Median	19.1	19.2	19.1	19.1	19.2	19.2	19.4	19.7	19.7	20.2	19.4	19.7	19.6	19.6	19.5	19.6	20.2	19.4	
% Overweight ^{b,c}	14	15	13	15	15	10	14	15	14	13	15	15	16	16	14	14	15	15	
% Obese ^{b,c}	14	14	16	17	18	19	19	20	20	24	21	18	18	21	20	20	24	19	
% Overweight including obese	28	29	29	31	33	29	33	35	35	37	36	33	34	36	34	34	38	34	
Girls																			
Mean	20.6	20.8	20.7	21.0	20.5	21.0	21.2	21.2	21.5	22.2	21.4	21.1	21.1	21.2	20.8	20.8	21.3	20.9	
Standard error of the mean	0.16	0.18	0.13	0.17	0.28	0.24	0.19	0.13	0.2	0.33	0.21	0.13	0.13	0.11	0.19	0.15	0.29	0.27	
Median	19.9	20.2	20.1	20.4	20.1	20.6	20.6	20.6	20.8	21.3	20.8	20.5	20.4	20.3	20.1	20.2	20.4	20.4	
% Overweight ^{b,c}	14	14	16	16	14	15	18	15	17	20	14	17	15	16	15	17	19	18	
% Obese ^{b,c}	16	16	16	18	16	19	18	20	22	27	21	17	19	18	15	17	17	19	
% Overweight including obese	30	30	32	34	29	33	36	35	39	46	36	34	34	34	31	33	36	37	
Bases (unweighted)																			
Boys	584	640	1116	569	294	282	577	1214	553	231	459	1154	1249	1167	647	837	220	232	
Girls	558	580	1066	575	254	309	552	1192	547	240	460	1105	1169	1159	587	766	207	233	
Bases (weighted)																			
Boys	658	713	1056	644	343	305	617	1380	573	244	438	1084	1120	1117	593	786	253	265	
Girls	635	648	987	657	322	318	604	1343	535	235	417	1033	1046	1039	548	734	245	248	

^a Data for all years have been weighted to correct for the probability of selection. From 2003, non-response weighting has also been applied.

^b Categories are mutually exclusive, i.e. overweight does not include those who are obese.

^c Overweight was defined as at or above the 85th but below the 95th UK National BMI centile; obese was defined as at or above the 95th UK National BMI centile.