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# Trends in weight loss attempts among children in England

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## ABSTRACT

**Objectives** To describe trends in reported weight loss attempts among school-aged children and to investigate its sociodemographic determinants.

**Design** We analysed data of children who participated in the Health Survey for England from 1997 to 2016 (n=34 235). This repeated cross-sectional survey reported weight loss attempts and sociodemographic characteristics. Body weight and height were measured by trained interviewers, and body mass index for age z-score was calculated. Multivariable logistic regression was used to investigate the sociodemographic determinants.

**Setting** England.

**Participants** Children (8–17 years).

**Main outcome measures** Weight loss attempts by year, age group, gender, BMI for age z-score, ethnicity and household income.

**Results** The prevalence of reported weight loss attempts increased significantly from 21.4% (1997–1998) to 26.5% (2015–2016). The increase was significant for boys, older children, Asian children, children from lower income households and in all categories of BMI for age z-score. Significant predictors of weight loss attempts included having overweight (8–12 years old, OR 4.01 (%CI 3.47 to 4.64); 13–17 years old, OR 1.96 (%CI 1.58 to 2.42)) or obesity (8–12 years old, OR 13.57 (%CI 11.94 to 15.43); 13–17 years old, OR 4.72 (%CI 3.94 to 5.66)) as well as being older, girls, from ethnic minority groups or low household income.

**Conclusion** The prevalence of reported weight loss attempts among children is increasing at a faster rate than the rise in excess weight and includes an increasing proportion of children with a 'healthy' weight. The increase in the prevalence of reported weight loss attempts among children is greatest among subgroups with lower baseline prevalence.

## INTRODUCTION

There has been a steady rise in the prevalence of overweight and obesity in English children, and currently more than a third of UK children have overweight or obesity.<sup>1</sup> It is well established that excess weight in children is an important risk factor for ill-health both in childhood, especially psychological harms and in the longer term because of the increased risk of diabetes, cardiovascular disease and musculoskeletal complications.<sup>2</sup> In addition to the personal health burden, childhood obesity and its sequelae lead to increased cost to the National Health Service (NHS) and the wider economy.<sup>3–5</sup>

## WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ There has been a steady rise in the prevalence of overweight and obesity in English children.
- ⇒ The rise is in parallel with an increased prevalence of eating disorders.
- ⇒ The were limited data on the prevalence of weight loss attempts among children.

## WHAT THIS STUDY ADDS

- ⇒ The prevalence in weight loss attempts among children increased significantly between 1997 and 2016.
- ⇒ The increasing trend is more pronounced among subgroups with a lower baseline prevalence.
- ⇒ Gender, ethnicity and household incomes are important sociodemographic determinants of weight loss attempts among children.

## HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ Weight management services for young people with obesity, including research into more effective interventions, needs to expand to meet the rise in weight loss attempts.
- ⇒ More research is needed to understand the drivers of weight loss attempts among young people with a healthy weight and to reduce their occurrence.
- ⇒ Policies to tackle obesity in young people need to be sensitive to reduce the risk of encouraging inappropriate weight control practices.

Childhood obesity was first named as a government priority in England in 2004, garnering attention from both health professionals and the public which continues to the present day.<sup>6,7</sup> In 2006, the National Institute for Health and Care Excellence (NICE) published their first guidelines on the prevention and treatment of excess weight in children leading to a rise in the commissioning of child weight management interventions.<sup>6</sup> However, little is known about the numbers or demographic characteristics of those attending these programmes or the prevalence of unsupported weight loss attempts.

There has also been a marked increase in the reported prevalence of eating disorders.<sup>8</sup> Although no causal relationship has been shown, the focus on obesity in children among policy makers and public



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health campaigners, the frequency and tone of media reporting, and the rise in a social media culture which promotes the 'thin ideal', have the potential to lead to an increase in weight dissatisfaction among children and young people who are not overweight.<sup>9</sup>

This study aimed to analyse trends in the prevalence of weight loss attempts among children aged 8–17 years, overall and by weight status and to identify sociodemographic characteristics associated with weight loss attempts including age, gender, ethnicity and household income.

## MATERIALS AND METHODS

### Study design and population

This analysis included 34 235 children aged 8–17 years who participated in the Health Survey for England (HSE) in 1997–1998 (n=6300), 2002 and 2005–2006 (n=7694), 2007–2008 (n=7745), 2009–2010 (n=4694), 2011–2012 (n=1520), 2013–2014 (n=850) and 2015–2016 (n=5432). The HSE is an annual cross-sectional population-based survey of general health that includes a nationally representative sample of the English population. Participants were selected from geographically representative households identified through multistage random probability sampling. Further information on the survey methodology can be found online and in published reports.<sup>10</sup> Research ethics consent for each survey was obtained from the relevant Research Ethics Committee prior to each survey. No additional approval was required for this analysis.

The HSE surveys vary each year and only the 1997, 1998, 2002, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 and 2016 surveys asked participants if they were currently attempting to lose weight and were included in this analysis.

### Interview responses

Informed consent for children aged 8–15 years was obtained from the parents on behalf of the children with their agreement to proceed with the survey and any measurements. Young people aged 16 and 17 years old provided their own consent. Information about children aged 8–12 years was collected from a parent in the presence of their children during the interview whenever possible. The children were also asked if they could contribute information where appropriate. Older children aged 13–17 years were interviewed directly after permission was obtained from the child's parent or guardian and the whole interview process was conducted in the presence of the child's parent or guardian.

Children reported if they were actively seeking to manage their weight by responding to the following question: 'At the present time, are you trying to lose weight, trying to gain weight, or are you not trying to change weight?'

### Sociodemographic characteristics

Sociodemographic variables included self-reported age, gender, ethnicity and household income level. During data collection, age was categorised into two groups: younger children aged 8–12 years and older children aged 13–17 years. The population was divided into four major ethnicities: white, Asian, black and other/mixed. Household income level was grouped into five household equivalised income quintiles based on HSE classifications.

### Anthropometric measurements

Height and weight were measured by trained nurses in a physical examination during a home visit. Height was measured

barefoot using a portable stadiometer and weight using a SECA weighing scale. Body mass index (BMI) for age z-score (BAZ) was calculated and classified based on WHO BMI for age and gender (5–19 years); thinness <-2SD, normal -2SD<=1SD, overweight >1SD<=2SD and obesity >2SD,<sup>11</sup> and we adopt these terms throughout this paper.

### Statistical analyses

STATA V.15 (Stata Corp, College Station, Texas, USA) was used for all the analyses. Survey commands using weight, primary sampling unit and cluster variables were used to obtain nationally representative results, correct for non-response bias and account for clustering in the sampling. 'For those variables with children with missing data (BAZ classifications 16.8% and household income 15.6%), a missing category was included for each.' In each survey, descriptive statistics were compared for each subgroup among those trying to lose weight and the rest of the sample using Student's t-test for continuous variables and  $\chi^2$  for proportions. The prevalence of weight loss attempts for the whole sample and subgroups comprising younger/older children and BAZ classifications were calculated. Associations between sociodemographic factors and the likelihood of attempting weight loss were analysed using a multivariable logistic regression model including time (survey year), participant's BAZ classifications, age (continuous), gender, ethnicity and household income. For the logistic regression analysis, those who reported a weight loss attempt were compared with the rest, therefore, those who were 'not trying to change weight' and those who were 'trying to gain weight (n=1456; 4.2%)' were coded into one category. A p value of 0.05 was set to denote statistical significance.

## RESULTS

### Study population

A final sample of 34 235 children aged 8–17 who participated in the HSE from 1997 to 2016 were included in this analysis (table 1) (online supplemental table 1 for the breakdown).

### Trends in prevalence of weight loss attempts

There was a significant increase over time in the proportion of children reporting weight loss attempts, from 21.4% in 1997–1998 to 26.4% in 2015–2016 (p=0.001) (online supplemental table 2). The absolute prevalence of weight loss attempts increased as BMI for age z-score increased (figure 1A), from 5.3% to 13.6% among children with a healthy weight, from 9.0% to 39.3% for children with overweight and 32.9% vs 62.6% for children with obesity, over the same time period. The most notable increase in the prevalence of weight loss attempts was in the period 2011–2012 and was apparent across all BMI for age z-scores categories. For example, from 2009–2010 to 2011–2012, prevalence of weight loss attempts increased from 13% to 48.6% among children with overweight and from 38.1% to 81% among children with obesity (figure 1A). Among older children, the frequency of weight loss attempts among children with overweight increased from 4.3% to 57.5% and among children with obesity from 31.4% to 81.7% from 2009–2010 to 2011–2012 (figure 1C). The 2011–2012 survey year was the first to find evidence of a notable proportion of children with a healthy weight reporting weight loss attempts, up from 0% in the previous year to 15.2%. Similar trends were also apparent in younger children (figure 1B).

The absolute prevalence of reported weight loss attempts were generally higher in girls than boys (figure 2A) but the increase over time was significant only for boys (online supplemental table

**Table 1** Demographic and anthropometric characteristics of children aged 8–17 years old from 1997 to 2016

	Trying to lose weight		Not trying to lose weight	
	n	Mean±SD/%	n	Mean±SD/%
Age (years)	8661	12.4±2.47	25 574	11.5±2.52*
Age group				
8–12	5330	60.5	18 371	70.7*
13–17	3331	39.5	7203	29.3*
Weight (kg)	8661	53.0±22.0	25 574	40.8±16.8*
BMI z-score	6446	2.56±1.47	23 604	1.03±1.62*
BMI category				
Thinness	6	0.1	482	2.2*
Normal	1023	17.4	11 804	51.5*
Overweight	1231	19.7	4714	19.8
Obesity	4206	62.8	6604	26.6*
Gender				
Boys	3440	40.4	13 628	53.9*
Girls	5221	59.6	11 946	46.1*
Ethnicity				
White	7053	79.1	22 074	84.8*
Asian	810	10.9	1658	7.5*
Black	394	5.2	806	3.5*
Other and mixed	404	4.9	1036	4.3
Household income level				
Q1	1875	27.5	4954	24.1*
Q2	1586	21.5	4442	20.2
Q3	1557	20.9	4677	20.9
Q4	1313	17.1	4375	19.1*
Q5	988	13.1	3540	15.6*

Estimates are mean±SD or % in which % are added up vertically; BAZ, BMI for age z-score; Q1 (<=GBP11 676.65), Q2 (>GBP11 676.65<=GBP19 117.65), Q3 (>GBP19 117.65<=GBP27 704.92), Q4 (>GBP27 704.92<=GBP47 794.12) and Q5 (>GBP47 794.12). Children 'Not-trying to lose weight' include those 'trying to gain weight (n=1,456 (4.2%))'. Missing values; BAZ classifications 16.8%, household income level 15.6%.

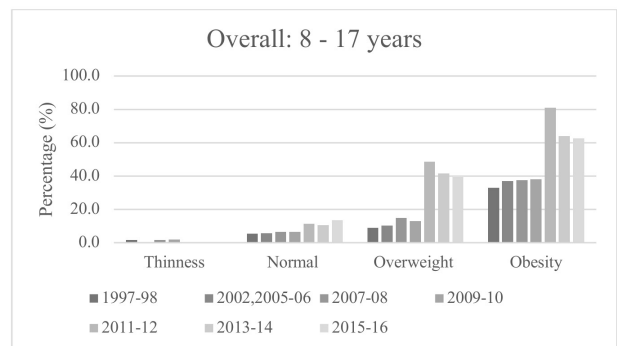
\*Significant different (p<0.05) between groups ( $\chi^2$  and t-test). BAZ, body mass index for age z-score; BMI, body mass index.

2). The absolute prevalence of weight loss attempts was higher among older children than the younger children (figure 2B) and increased significantly over time among older (p=0.038), but not younger children (p=0.162) (online supplemental table 2). The prevalence of reported weight loss attempts was higher in ethnic minorities than white children in both age groups and there was a significant upward trend over time among Asian children aged 13–17 (p=0.049). The prevalence of reported weight loss attempts was higher among households with lower income with a significant upward trend among children with the lowest quartile of household income aged 8–12 and children from the Q2 of household income aged 13–17.

### Determinants of weight loss attempts

Logistic regression analyses showed that weight status, ethnicity and household income levels were independently associated with weight loss attempts in younger children, while gender was also an independent predictor in older children (table 2). Compared with children with a healthy weight, the children with overweight and obesity were more likely to have attempted to lose weight (8–12 years old, OR 4.01, %CI 3.47 to 4.64 and OR 13.57, %CI 11.94 to 15.43; 13–17 years old, OR 1.96, %CI

A



B



C

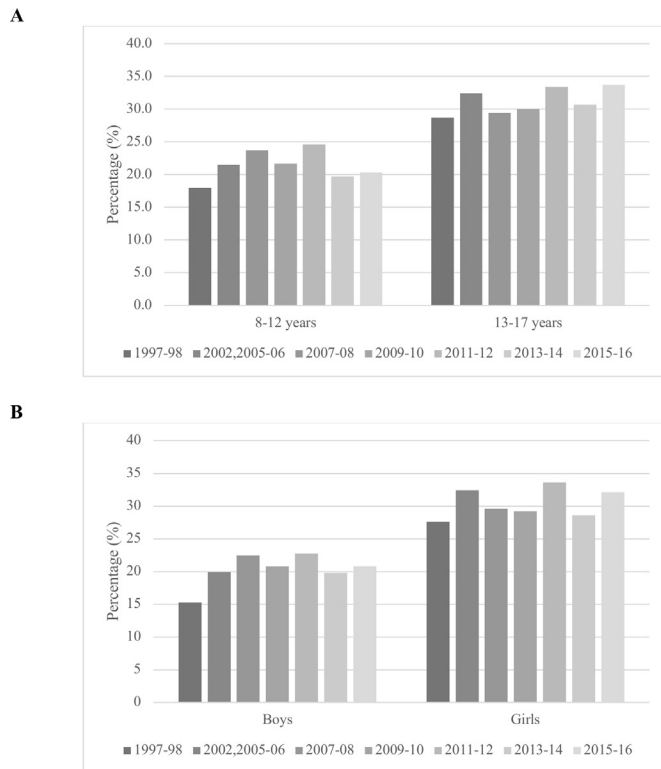


**Figure 1** Prevalence of weight loss attempts by body mass index category among children. (A) Overall: 8–17 years. (B) Age group: 8–12 years. (C) Age group: 13–17 years included in Health Survey for England from 1997 to 2016.

1.58 to 2.42 and OR 4.72, %CI 3.94 to 5.66, respectively). Girls were more likely to report weight loss attempts than boys (OR 2.66, %CI 2.41 to 2.95) in older children only; Asian children (8–12 years old, OR 1.72, %CI 1.43 to 2.07; 13–17 years old, OR 1.57, %CI 1.29 to 1.93) and black children (8–12 years old, OR 1.32, %CI 1.03 to 1.68; 13–17 years old, OR 1.37, %CI 1.02 to 1.84) compared with the white children. Younger children from the lowest and second quintile of household income level were more likely to have weight loss attempts than the highest quintile (OR 1.21, %CI 1.01 to 1.44 and OR 1.20, %CI 1.01 to 1.43, respectively), while older children from the third quintile were more likely to have weight loss attempts than the highest quintile (OR 1.22, %CI 1.02 to 1.47). Univariate analysis is shown in online supplemental table 3.

### DISCUSSION

In England in 2015/2016, around one in five children aged 8–12 years old and one in three children aged 13–17 years old



**Figure 2** Prevalence of weight loss attempts in children (A) by age group and (B) by gender included in the Health Survey for England from 1997 to 2016.

reported attempts to lose weight, including some children with a healthy weight. The prevalence of weight loss attempts increased during the preceding decade in all BMI for age z-score categories, especially among boys, older children, children of Asian

ethnicity or from lower income families, compared with their peers. Overall, having overweight or obesity, as well as being female, from an ethnic minority group or low-income household significantly predicted weight loss attempts in this population.

Data on weight loss attempts in children are relatively sparse. A cross-sectional study conducted among European, Israel and North American adolescents with overweight and obesity in 2001/2002 showed the prevalence of weight loss attempts ranged from 5% to 76%.<sup>12</sup> Data from the 2005–2014 National Health and Nutrition Examination Survey (NHANES) found that 28.2% of children aged 8–15 years old made persistent attempts to lose weight,<sup>13</sup> while a more recent study in Canada showed 48% of children aged 8–10 years old reported weight loss attempts.<sup>14</sup> Excess weight is one of the most significant determinants of weight loss attempts.<sup>12–15</sup> One study reported a 5% increase in the OR of weight loss attempts per BMI unit increase.<sup>13</sup>

Our findings of the relationships between weight loss attempts and sociodemographic characteristics are generally consistent with those previously reported. For example, it has been reported that the prevalence of self-reported dieting is higher in older children<sup>14–16</sup> and girls<sup>12–17–18</sup> compared with younger children or boys. Although we found the absolute prevalence was constantly higher among girls, we found a significant increase in weight loss attempts over time among boys from both age groups but not in girls. Several other studies have reported a marked increase in weight loss attempts among boys over time.<sup>17–19–20</sup> Consistent with other surveys, weight loss attempts was more commonly reported among children from ethnic minority groups than the white population.<sup>13–15–21</sup> Children from the highest quintile of household income were less likely to report attempting to lose weight than those from the lower quintiles.<sup>13</sup> Correspondingly, a previous study reported a large proportion of low-income African-American adolescents (43.4%) tried to lose weight.<sup>22</sup>

**Table 2** Associations between demographic characteristics or BMI category and attempts to lose weight

	8–12 years old			13–17 years old		
	OR	95% CI	P value	OR	95% CI	P value
Year of survey	1.02	1.01 to 1.03	<0.001	1.07	1.06 to 1.08	<0.001
BMI category*						
Underweight	0.18	0.08 to 0.40	<0.001	N/A	N/A	<0.001
Overweight	4.01	3.47 to 4.64	<0.001	1.96	1.58 to 2.42	<0.001
Obesity	13.57	11.94 to 15.43	<0.001	4.72	3.94 to 5.66	<0.001
Gender						
Girls	1.04	0.95 to 1.15	0.373	2.66	2.41 to 2.95	<0.001
Ethnicity						
Asian	1.72	1.43 to 2.07	<0.001	1.57	1.29 to 1.93	<0.001
Black	1.32	1.03 to 1.68	0.028	1.37	1.02 to 1.84	0.039
Other and mixed	1.19	0.94 to 1.50	0.145	1.17	0.91 to 1.50	0.224
Household income levels						
Q1	1.21	1.01 to 1.44	0.036	1.18	0.98 to 1.42	0.086
Q2	1.20	1.01 to 1.43	0.036	1.18	0.97 to 1.43	0.090
Q3	1.14	0.96 to 1.36	0.144	1.22	1.02 to 1.47	0.034
Q4	1.06	0.88 to 1.27	0.564	1.09	0.90 to 1.33	0.372

\*BMI for age z-score; Q1 ( $\leq$ GBP11 676.65), Q2 ( $>$ GBP11 676.65 $\leq$ GBP19 117.65), Q3 ( $>$ GBP19 117.65 $\leq$ GBP27 704.92), Q4 ( $>$ GBP27 704.92 $\leq$ GBP47 794.12) and Q5 ( $>$ GBP47 794.12). Estimates from multivariable logistic regression model. Each coefficient shows the OR of trying to lose weight compared with the reference category while adjusting for all other determinants of weight loss attempts. Reference groups for categorical variables; boys, whites,  $>$ GBP47 794.12, and normal BAZ classification. Estimates for missing category (BAZ classifications and household income) are omitted. For survey year, the OR is per increasing year. There is no OR estimate for 13–17 age group because there was nobody trying to lose weight. P value $<$ 0.05 to denote statistical significance.

BAZ, body mass index for age z-score; BMI, body mass index.

Findings from the HSE on weight loss attempts in adults over a similar time period also showed a significant increase in the proportion of people trying to lose weight, from 39% in 1997 to 50% in 2015 with the biggest determinants of weight loss attempts having overweight/obesity and being female.<sup>23</sup> However, we observed a marked increase in reported weight loss attempts from 2011 to 12 onwards which was not apparent in the data for adults including among children with a healthy weight. Although this observational analysis cannot establish the cause, this date marked the start of individual feedback on weight status to parents or carers as part of the National Child Measurement Programme (NCMP).<sup>24</sup> The NCMP was established as a screening programme in 2006 to measure the height and weight of children at reception (aged 4–5 years) and year 6 (aged 10–11 years) at school by trained staff.<sup>25</sup> However, individual level feedback from the NCMP was not provided until 2010–2011 and sparked considerable media attention in relation to childhood obesity. Parents were provided written weight feedback with information about their child's BMI category, defined using centiles of the UK 1990 growth curves; clinical cut-offs at the 2nd, 91st and 98th BMI centiles defined underweight, healthy weight, overweight and obese (described to parents as 'very overweight').<sup>26</sup> In addition, information about the health risks, associated with their child's weight status, healthy lifestyles from the government healthy lifestyle campaign and local health and leisure services are also provided.<sup>27</sup> A previous survey found that the provision of NCMP weight feedback increased recognition of childhood overweight and encouraged some parents to seek help, but it is also plausible that this prompted greater self-management.<sup>24</sup>

The rise in efforts to lose weight loss among children who were overweight or obese may imply some success in communicating the importance of weight control to this group, although this inference is tempered by the absence of information on the nature of these weight loss attempts. It is of concern that the increase has not been matched by an increase in the provision of weight management services in England, creating a risk of unsupervised and potentially inappropriate weight control behaviours. Meanwhile, the rise in weight loss attempts among children with a healthy weight raises concerns and suggests greater attention is needed to target weight control messages appropriately.

This study, using multiple HSE surveys, reports the recent trends in weight loss attempts among children in England. A key strength of the present study is that the findings are nationally representative. Anthropometric measurements were taken by trained nurses at the home visits using calibrated machines and standardised protocol, minimising any risk of measurement error or misreporting. However, the overall sample size means that some subgroup comparisons such as household income levels and BAZ were limited by small numbers. Parents were responsible for answering interview questions on behalf of the younger children, whereas the older children aged 13–17 years answered the survey by themselves. These discrepancies in the interview process between young and older children may lead to bias and under-reporting, based on parental perceptions of weight control attempts, hence dividing them into two separate age groups for analysis. The accuracy of reported weight loss attempts is dependent on the perceptions of a weight loss attempt and the understanding of weight loss practices among parents and children and may not reflect professional perspectives of a weight loss attempt, nor is there information on the strategies employed in weight loss attempts. A further limitation is that the questions about weight loss attempts were not asked

every year limiting our ability to look for recent changes. Weight loss attempt was asked based on only a single question, further information such as the methods used to lose weight and how much weight was lost were not available.

## CONCLUSION

The rise in childhood obesity in recent years has coincided with an increase in self-reported weight loss attempts, particularly among population subgroups with lower baseline prevalence of weight loss attempts. However, this includes an increase among children with a healthy weight, suggesting a parallel increase in inappropriate weight concern.

**Contributors** AA conceptualised and designed the study, carried out the analyses, drafted the manuscript, and reviewed and revised the manuscript. ML drafted, reviewed and revised the manuscript. CP conceptualised and designed the study, supervised the analyses, reviewed and revised the manuscript and was the guarantor of the study. SJ conceptualised and designed the study, supervised the whole study and critically reviewed the manuscript for important intellectual content. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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**Supplemental Table 1: Demographic and anthropometric characteristics of children aged 8 – 17 years old**

		1997-98 (n=6,300)				2002,2005-06 (n=7,694)			
		Trying to lose weight		Not trying to lose weight		Trying to lose weight		Not trying to lose weight	
		n	mean±SD/%	n	mean±SD/%	n	mean±SD/%	n	mean±SD/%
Age (y)		1,364	12.7±2.6	4,936	11.7±2.7	2,038	12.8±2.5	5,656	11.9±2.7
Age group	8-12	776	57.3	3,510	71.0	1,173	59.8	3,938	71.7
	13-17	588	42.7	1,426	29.0	865	40.2	1,718	28.3
Weight		1,364	54.9±20.2	4,936	41.7±15.8	2,038	54.9±22.3	5,656	42.3±17.2
BMI Z-score		975	2.99±1.45	4,650	1.19±1.71	1,333	3.12±1.34	5,203	1.38±1.68
BMI category	Thinness	2	0.2	94	2.1	0	0.0	82	1.9
	Normal	115	12.3	2,110	45.6	116	9.8	2,116	42.4
	Overweight	89	9.2	898	19.3	124	8.8	1,053	19.9
	Obesity	769	78.3	1,548	33.1	1,093	81.4	1,952	35.8
Gender	Boys	490	35.9	2,657	54.1	745	37.8	3,077	54.0
	Girls	874	64.1	2,279	45.9	1,293	62.2	2,579	46.0
Ethnicity	White	1,196	86.9	4,465	89.7	1,761	85.4	5,042	88.4
	Asian	90	7.4	260	5.8	150	7.8	286	5.9
	Black	38	2.8	102	2.1	70	3.6	156	2.5
	Other&Mixed	40	2.9	109	2.3	57	3.2	172	3.2
Household income level	Q1	321	27.4	1,084	25.7	414	26.1	1,139	25.6
	Q2	219	18.4	778	17.9	397	22.4	990	20.1
	Q3	270	21.7	1,001	22.3	375	23.2	1,090	21.6
	Q4	234	18.8	904	19.7	304	16.6	968	18.4
	Q5	174	13.8	665	14.5	220	11.7	731	14.3

Estimates are mean±SD or % in which % are added up vertically; BAZ BMI for Z score;

Q1(≤GBP11,676.65), Q2(>GBP11,676.65≤GBP19,117.65), Q3(>GBP19,117.65≤GBP27,704.92), Q4(>GBP27,704.92≤GBP47,794.12) and Q5(>GBP47,794.12)

Different total sample size for BMI, n=5,625 (1997-98), n=6,536 (2002-03); household income level, n=5,650 (1997-98), n=6,628 (2002-03)

Supplemental Table 1 continued

		2007-08 (n=7,745)				2009-10 (n=4,694)			
		Trying to lose weight (n=2,014)		Not trying to lose weight		Trying to lose weight		Not trying to lose weight	
		n	mean±SD/%	n	mean±SD/%	n	mean±SD/%	n	mean±SD/%
Age (y)		2,014	11.9±2.1	5,731	11.4±2.3	1,182	12.1±2.2	3,512	11.4±2.3
Age group	8-12	1,462	70.5	4,351	74.2	804	67.3	2,704	75.6
	13-17	552	29.5	1,380	25.8	378	32.7	808	24.4
Weight		2,014	50.6±21.6	5,731	40.4±16.4	1,182	50.6±22.6	3,512	39.5±16.5
BMI Z-score		1,409	2.90±1.45	5,252	1.22±1.67	836	2.88±1.46	3,197	1.10±1.69
BMI category	Thinness	2	0.1	104	2.1	2	0.2	100	3.2
	Normal	160	11.6	2,308	44.2	94	11.6	1,426	43.7
	Overweight	186	12.1	1,065	20.0	110	12.6	678	21.6
	Obesity	1,061	75.2	1,775	33.7	630	75.6	993	31.6
Gender	Boys	885	44.2	3,010	53.5	517	42.1	1,893	53.2
	Girls	1,129	55.8	2,721	46.5	665	57.9	1,619	46.8
Ethnicity	White	1,659	80.1	4,927	84.2	987	81.7	3,031	85.0
	Asian	182	10.0	360	7.3	84	8.5	237	7.4
	Black	88	5.6	199	4.2	54	4.9	97	3.2
	Other&Mixed	85	4.3	245	4.3	57	4.9	147	4.4
Household income level	Q1	432	27.6	1,032	22.6	243	26.9	643	23.8
	Q2	370	22.6	1,034	21.5	239	23.9	661	22.2
	Q3	351	20.9	1,055	21.6	213	20.2	589	19.0
	Q4	318	17.9	940	18.5	167	15.6	610	19.3
	Q5	199	11.1	786	15.8	136	13.3	485	15.7

Estimates are mean±SD or % in which % are added up vertically; BAZ BMI for Z score;

Q1(≤GBP11,676.65), Q2(>GBP11,676.65≤GBP19,117.65), Q3(>GBP19,117.65≤GBP27,704.92), Q4(>GBP27,704.92≤GBP47,794.12) and Q5(>GBP47,794.12)

Different total sample size for BMI, n=6661 (2007-08), n=4033 (2009-10); household income level, n=6517 (2007-08), n=3986 (2009-10)



Supplemental Table 1 continued

		2011-12 (n=1,520)				2013-14 (n=850)			
		Trying to lose weight		Not trying to lose weight		Trying to lose weight		Not trying to lose weight	
		n	mean±SD/%	n	mean±SD/%	n	mean±SD/%	n	mean±SD/%
Age (y)		414	12.0±2.1	1,106	11.2±2.3	213	12.2±2.2	637	11.3±2.3
Age group	8-12	303	70.9	251	73.9	142	66.8	493	76.0
	13-17	111	29.1	855	26.1	71	33.2	144	24.0
Weight		414	51.8±22.9	1,106	37.5±18.2	213	53.4±21.9	637	38.4±17.8
BMI Z-score		378	1.60±1.00	997	0.16±1.00	199	1.55±0.93	577	0.29±1.07
BMI category	Thinness	0	0.0	21	2.1	0	0.0	7	1.2
	Normal	95	25.3	780	78.4	55	26.9	428	74.2
	Overweight	148	39.2	161	16.3	84	41.2	109	18.7
	Obesity	135	35.4	35	3.3	60	32.0	33	5.8
Gender	Boys	172	41.5	587	54.9	83	42.6	334	54.6
	Girls	242	58.5	519	45.1	130	57.4	303	45.4
Ethnicity	White	316	73.4	923	81.0	168	76.8	538	82.1
	Asian	47	13.5	94	10.0	19	10.8	47	9.2
	Black	25	6.3	42	4.2	11	5.4	26	4.2
	Other&Mixed	26	6.8	47	4.8	15	7.0	26	4.5
Household income level	Q1	89	27.5	174	20.5	58	33.2	138	25.5
	Q2	86	22.2	242	25.8	39	20.9	111	19.5
	Q3	61	15.6	164	16.7	39	19.8	118	21.7
	Q4	66	17.2	207	20.8	36	18.9	96	16.7
	Q5	56	17.5	164	16.1	15	7.2	99	16.6

Estimates are mean±SD or % in which % are added up vertically; BAZ BMI for Z score;

Q1(≤GBP11,676.65), Q2(>GBP11,676.65≤GBP19,117.65), Q3(>GBP19,117.65≤GBP27,704.92), Q4(>GBP27,704.92≤GBP47,794.12) and Q5(>GBP47,794.12)

Different total sample size for BMI, n=1,375 (2011-12), n=776 (2013-14); household income level, n=1,309 (2011-12), n=749 (2013-14)

Supplemental Table 1 continued

		2015-16 (n=5,432)			
		Trying to lose weight		Not trying to lose weight	
		n	mean±SD/%	n	mean±SD/%
Age (y)		1,436	12.7±3.0	3,996	11.6±2.9
Age group	8-12	670	42.0	2,520	59.1
	13-17	766	58.0	1,476	40.9
Weight		1,436	54.7±24.2	3,996	40.9±18.7
BMI Z-score		1,336	1.55±1.05	3,728	0.31±1.12
BMI category	Thinness	0	0.0	74	1.9
	Normal	388	31.1	2,636	71.3
	Overweight	490	35.4	750	19.7
	Obesity	458	33.4	268	7.2
Gender	Boys	548	39.9	2,070	54.5
	Girls	888	60.1	1,926	45.5
Ethnicity	White	966	65.0	3,148	77.5
	Asian	238	19.0	374	10.4
	Black	108	8.0	184	5.0
	Other&Mixed	124	8.0	290	7.1
Household income level	Q1	318	28.4	744	23.5
	Q2	236	20.0	626	18.4
	Q3	248	20.1	660	20.5
	Q4	188	15.8	650	19.8
	Q5	188	15.7	610	17.9

Estimates are mean±SD or % in which % are added up vertically; BAZ BMI for Z score; Q1(≤GBP11,676.65), Q2(>GBP11,676.65≤GBP19,117.65), Q3(>GBP19,117.65≤GBP27,704.92), Q4(>GBP27,704.92≤GBP47,794.12) and Q5(>GBP47,794.12); \*P<0.05 (Student t-test or chi<sup>2</sup>); Different total sample size for BMI, n=5,064 (2015-16), n=30,070 (1997-2016); household income level, n=4,468 (2015-16)

**Supplemental Table 2:** Trend in prevalence of weight loss attempts from 1997-98 to 2015-16

			1997-98 (n=6,300)			2002, 2005-06 (n=7,694)			2007-08 (n=7,745)			2009-10 (n=4,694)			2011-12 (n=1,520)			
			n	%	SE	n	%	SE	n	%	SE	n	%	SE	n	%	SE	
<b>BMI category</b>	<b>Age group</b>	<b>Total</b>	6,300	21.4	0.5	7,694	26.2	0.7	7,745	26.0	0.5	4,694	25.0	0.7	1,520	28.1	1.3	
		<b>8-12 years</b>	4,286	18.0	0.6	5,111	22.8	0.9	5,813	25.0	0.6	3,508	22.9	0.7	1,106	27.2	1.5	
		<b>13-17 years</b>	2,014	28.7	1.0	2,583	33.4	1.4	1,932	28.6	1.1	1,186	30.8	1.4	414	30.3	2.5	
	<b>8-12 years</b>	Thinness	95	1.7	1.2	80	0.0	0	106	1.7	1.2	102	1.9	1.3	14	0.0	0.0	
		Normal	2,104	5.6	0.5	2,129	5.9	0.9	2,329	6.9	0.5	1,442	6.8	0.8	651	9.6	1.3	
		Overweight	711	11.6	1.3	837	12.9	1.6	940	18.7	1.4	591	16.2	1.5	237	45.5	3.7	
		Obesity	1,088	39.8	1.7	1,504	42.5	1.9	1,764	44.7	1.3	965	42.8	1.6	144	80.9	3.5	
		<b>13-17 years</b>	Thinness	1	0.0	0.0	2	0.0	0	0	0.0	0	0	0.0	0.0	7	0.0	0.0
			Normal	121	0.7	0.7	103	0.0	0	139	2.1	1.2	78	0.0	0.0	224	15.2	2.5
	Overweight		276	2.2	0.9	340	3.0	0.9	311	4.5	1.4	197	4.3	1.4	72	57.5	5.9	
	<b>8-12 years</b>	Obesity	1,229	27.0	1.3	1,541	31.1	1.7	1,072	26.7	1.4	658	31.4	1.9	26	81.7	7.5	
		Boys	2,170	15.2	0.8	2,582	19.9	1.1	2,922	23.6	0.9	1,835	21.3	1.0	555	23.6	2.0	
			Girls	2,116	20.9	0.9	2,529	25.7	1.3	2,891	26.5	0.9	1,673	24.4	1.1	603	30.7	2.2
		<b>13-17 years</b>	Boys	977	15.6	1.2	1,240	19.7	1.8	979	19.5	1.3	575	19.5	1.7	204	20.9	3.0
			Girls	1,037	41.3	1.6	1,343	46.5	2	959	38.3	1.6	611	42.4	2.2	158	42.7	4.1
		<b>Ethnicity</b>	<b>8-12 years</b>	White	3,840	17.2	0.7	4,534	22.4	0.9	4,915	24.1	0.7	2,986	21.9	0.8	933	25.1
	Asian			235	23.3	2.7	276	29.5	3.9	418	31.5	2.6	251	26.1	2.9	112	34.1	5.0
Black	96			26.8	4.7	143	24.2	5.3	221	31.0	3.7	113	35.7	4.8	55	39.5	6.0	
Other&Mixed	115		23.9	4.0	158	21.5	5	259	23.1	2.8	158	24.9	3.6	58	32.0	6.2		
<b>13-17 years</b>	White		1,821	28.6	1.1	2,269	32.4	1.5	1,671	27.4	1.1	1,032	30.5	1.5	306	28.9	2.7	
	Asian		115	31.9	3.8	160	36.6	5.3	124	35.7	4.5	70	34.2	5.8	29	35.8	9.7	
	Black		44	25.4	6.0	83	52.6	8.5	66	34.3	6.1	38	28.8	8.4	12	26.2	14.0	
	Other&Mixed		34	30.1	7.1	71	35.0	10.4	71	35.3	5.6	46	34.0	7.4	15	46.1	13.7	

Q1( $\leq$ GBP11,676.65), Q2( $>$ GBP11,676.65 $\leq$ GBP19,117.65), Q3( $>$ GBP19,117.65 $\leq$ GBP27,704.92), Q4( $>$ GBP27,704.92 $\leq$ GBP47,794.12) and Q5( $>$ GBP47,794.12); n, total sample; %, proportion of weight loss attempts; Different total sample size for BMI, n=5,625 (1997-98), n=6,536 (2002,2005-06), n=6,661 (2007-08), n=4,033 (2009-10), n=1,375 (2011-12), n=749 (2013-14), n=5,064 (2015-16)

Continued Supplemental Table 2

			1997-98 (n=6,300)			2002, 2005-06 (n=7,694)			2007-08 (n=7,745)			2009-10 (n=4,694)			2011-12 (n=1,520)		
			n	%	SE	n	%	SE	n	%	SE	n	%	SE	n	%	SE
<b>Household income level</b>	<b>8-12 years</b>	Q1	1,007	18.9	1.3	1,088	23.5	1.9	1,109	28.7	1.5	665	24.7	1.8	201	35.8	3.9
		Q2	662	18.4	1.5	911	26.3	2.1	1,057	25.5	1.4	679	23.2	1.7	251	24.6	2.9
		Q3	861	17.9	1.3	996	21.5	2	1,052	24.1	1.4	598	24.1	1.8	169	27.4	3.7
		Q4	772	17.2	1.5	865	21.3	2.1	945	23.9	1.5	595	20.2	1.8	210	22.1	3.1
		Q5	560	16.6	1.6	649	17.0	2.1	756	19.0	1.5	462	21.0	1.9	171	28.5	4.5
	<b>13-17 years</b>	Q1	398	31.5	2.4	465	32.4	3.4	355	31.8	2.5	221	35.0	3.4	62	30.6	5.8
		Q2	335	28.7	2.5	476	31.0	2.8	347	29.4	2.5	221	36.3	3.5	77	26.8	5.3
		Q3	410	27.2	2.2	469	39.1	3.9	354	27.2	2.4	204	31.9	3.5	56	25.4	5.8
		Q4	366	27.7	2.5	407	29.0	3.2	313	27.4	2.6	182	24.2	3.2	63	31.0	5.7
		Q5	279	28.3	2.8	302	33.2	3.3	229	20.3	2.8	159	25.0	3.5	49	33.5	6.9

Q1( $\leq$ GBP11,676.65), Q2( $>$ GBP11,676.65 $\leq$ GBP19,117.65), Q3( $>$ GBP19,117.65 $\leq$ GBP27,704.92), Q4( $>$ GBP27,704.92 $\leq$ GBP47,794.12) and Q5( $>$ GBP47,794.12); n, total sample; %, proportion of weight loss attempts; Different total sample size for household income level, n=5,650 (1997-98), n=6,628 (2002,2005-06), n=6,517 (2007-08),n=4,694 (2009-10), n=1,309 (2011-12), n=776 (2013-14), n=4,468 (2015-16)

**Supplemental Table 2:** Trend in prevalence of weight loss attempts from 1997-98 to 2015-16

			2013-14 (n=850)			2015-16 (n=5,432)			Absolute difference*	
			n	%	SE	n	%	SE	%	P-value
	<b>Total</b>		850	24.0	1.6	5,432	26.4	1.0	5.00	0.001*
<b>BMI category</b>	<b>Age group</b>	<b>8-12 years</b>	635	19.7	1.8	3,190	20.3	1.2	2.30	0.162
		<b>13-17 years</b>	215	30.7	2.7	2,242	33.7	1.5	5.00	0.038*
	<b>8-12 years</b>	Thinness	6	0.0	0	26	0.0	0.0	-1.70	0.661
		Normal	357	9.2	1.6	1,692	6.4	1.0	0.80	0.104
		Overweight	143	35.5	4.2	782	30.7	2.7	19.10	0.000*
		Obesity	73	63.4	6.1	486	53.4	4.1	13.60	0.000*
	<b>13-17 years</b>	Thinness	1	0.0	0	48	0.0	0.0	0.00	NA
		Normal	126	13.8	3.1	1,332	21.2	1.8	20.50	0.000*
Overweight		50	57.8	7.1	458	52.2	3.6	50.00	0.000*	
Obesity		20	65.9	11.7	240	78.0	4.2	51.00	0.000*	
<b>Gender</b>	<b>8-12 years</b>	Boys	323	20.1	2.3	1,584	19.8	1.6	4.60	0.025*
		Girls	312	23.6	2.5	1,606	20.8	1.7	-0.10	0.879
	<b>13-17 years</b>	Boys	94	18.9	4.2	1,034	22.0	2.1	6.40	0.035*
		Girls	121	41.9	4.5	1,208	45.3	2.2	4.00	0.255
<b>Ethnicity</b>	<b>8-12 years</b>	White	533	20.3	1.9	2,414	16.3	1.1	-0.90	0.472
		Asian	45	27.2	6	358	34.6	4.6	11.30	0.094
		Black	24	26.7	1.1	160	30.4	6.4	3.60	0.530
		Other&Mixed	33	31.6	8.5	258	27.0	4.4	3.10	0.285
	<b>13-17 years</b>	White	173	30.4	3.6	1,700	31.2	1.8	2.60	0.394
		Asian	21	27.0	9.9	254	45.6	4.9	13.70	0.049*
		Black	13	33.2	14.6	132	43.3	6.8	17.90	0.427
		Other&Mixed	8	36.8	17.2	156	31.1	5.4	1.00	0.779

\*Absolute difference (%), 2015-16 – 1997-98; Q1( $\leq$ GBP11,676.65), Q2( $>$ GBP11,676.65 $\leq$ GBP19,117.65), Q3( $>$ GBP19,117.65 $\leq$ GBP27,704.92), Q4( $>$ GBP27,704.92 $\leq$ GBP47,794.12) and Q5( $>$ GBP47,794.12); n, total sample; %, proportion of weight loss attempts; Different total sample size for BMI, n=5,625 (1997-98), n=6,661 (2007-08), n=1,375 (2011-12), n=5,064 (2015-16)

Continued Supplemental Table 2

			2013-14 (n=850)			2015-16 (n=5,432)			Absolute difference*	
			n	%	SE	n	%	SE	%	P-value
<b>Household income level</b>	<b>8-12 years</b>	Q1	149	26.6	3.7	600	24.0	2.7	5.10	0.024*
		Q2	110	25.1	4.1	560	18.3	2.5	-0.10	0.501
		Q3	113	20.8	4.3	584	18.9	2.5	1.00	0.623
		Q4	92	21.8	4.5	484	14.6	2.5	-2.60	0.401
		Q5	93	10.7	3.4	466	20.3	3.0	3.70	0.169
	<b>13-17 years</b>	Q1	47	37.4	7.7	462	37.0	3.4	5.50	0.160
		Q2	40	26.3	7.4	302	42.9	4.9	14.20	0.015*
		Q3	44	26.2	6.7	324	37.1	3.9	9.90	0.221
		Q4	40	36.4	8.1	354	29.8	3.9	2.10	0.581
		Q5	21	17.4	8.1	332	27.7	4.0	-0.60	0.802

\*Absolute difference (%), 2015-16 – 1997-98; Q1( $\leq$ GBP11,676.65), Q2( $>$ GBP11,676.65 $\leq$ GBP19,117.65), Q3( $>$ GBP19,117.65 $\leq$ GBP27,704.92), Q4( $>$ GBP27,704.92 $\leq$ GBP47,794.12) and Q5( $>$ GBP47,794.12); n, total sample; %, proportion of weight loss attempts; Different total sample size for household income level, n=5,650 (1997-98), n=6,517 (2007-08), n=1,309 (2011-12), n=4,468 (2015-16)

**Supplemental Table 3:** Associations between demographic characteristics or BMI category and attempts to lose weight

	<b>OR</b>	<b>95% CI</b>		<b>P-value</b>
<b>Year of survey</b>	1.01	1.01	1.02	<0.001
<b>Age</b>	1.14	1.12	1.15	<0.001
<b>BMI category*</b>				
Underweight	0.12	0.05	0.27	<0.001
Overweight	2.94	2.60	3.31	<0.001
Obesity	6.96	6.31	7.69	<0.001
<b>Gender</b>				
Girls	1.73	1.63	1.84	<0.001
<b>Ethnicity</b>				
Asian	1.56	1.38	1.75	<0.001
Black	1.59	1.34	1.89	<0.001
Other & mixed	1.22	1.05	1.42	0.008
<b>Household income levels</b>				
Q1	1.36	1.22	1.53	<0.001
Q2	1.27	1.13	1.43	<0.001
Q3	1.19	1.06	1.34	0.004
Q4	1.07	0.94	1.21	0.296

\*BMI for age z-score; CI, confidence interval; OR, odds ratio, Q1( $\leq$ GBP11,676.65), Q2( $>$ GBP11,676.65 $\leq$ GBP19,117.65), Q3( $>$ GBP19,117.65 $\leq$ GBP27,704.92), Q4( $>$ GBP27,704.92 $\leq$ GBP47,794.12) and Q5( $>$ GBP47,794.12). Estimates from univariate logistic regression model. Each coefficient shows the OR of trying to lose weight compared with the reference category. Reference groups for categorical variables; boys, Whites,  $>$ GBP47,794.12, and normal BAZ classification. For age and survey year, the OR is per increasing year. P < 0.05 to denote statistical significance.