

Millennium Cohort Study Briefing 14

Childhood overweight and obesity

Based on Chapter 13 of *Children of the 21st century (Volume 2): The first five years*

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About these briefings

This Briefing is one of 14 that distil the key findings of the first three surveys of the Millennium Cohort Study, as collected in *Children of the 21st century (Volume 2): The first five years*.

The study has been tracking the Millennium children through their early childhood and plans to follow them into adulthood. It covers such diverse topics as parenting; childcare; school choice; child behaviour and cognitive development; child and parental health; parents' employment and education; income; housing; and neighbourhood.

It is the first of the nationwide cohort studies to over-sample areas with high densities of ethnic minorities and large numbers of disadvantaged families.

For the first survey, in 2001–2, interviewers visited the families of nearly 19,000 children aged 9 months throughout the United Kingdom. It established the circumstances of pregnancy and birth, as well as the families' social background. The second survey recorded how nearly 16,000 cohort children were developing at age 3. The third survey, when they were age 5, involved almost 15,500 children and provided a uniquely

detailed account of their physical, cognitive and social development in the year they entered school.

The study is housed at the Centre for Longitudinal Studies at the Institute of Education, University of London. It was commissioned by the Economic and Social Research Council, whose funding has been supplemented by a consortium of government departments.

Children of the 21st century (Volume 2): The first five years, edited by Kirstine Hansen, Heather Joshi and Shirley Dex, The Policy Press, 2010, can be ordered via www.policypress.co.uk

Introduction

The World Health Organization estimates that 1.2 billion people are overweight, and 300 million of them are obese (Government Office for Science 2007). The most startling population-wide weight increases have taken place in the USA and UK where the prevalence of overweight and obesity has almost doubled in the past 25 years. These increases are not confined to adult populations. The Health Survey for England² found that the proportion of 2 to 10-year-olds who were overweight – including those who were obese – increased from 23 per cent in 1995 to 28 per cent in 2003. These changes appear to be accelerating and the age at which the onset of obesity occurs is dropping.

Tackling childhood obesity – and, by so doing, preventing short-and long-term health problems – is consequently a priority for the UK government. In 2007, a long-term public service agreement (PSA) target for addressing childhood obesity was set. The aim is to ‘reduce the proportion of overweight and obese children to 2000 levels by 2020 in the context of tackling obesity across the population’ (HM Government 2007).

Data from the UK-wide Millennium Cohort Study (MCS) provide the ideal opportunity to examine the development of obesity and its consequences from a very young age. This Briefing provides an analysis of the weight and height data obtained when cohort members were aged 3 and 5. It also reports on the prevalence of obesity and overweight at these ages, examines stability and change between these ages, and identifies risk factors.

Examining overweight and obesity in the MCS

Research into the determinants of childhood growth, overweight and obesity has been a priority for MCS since its inception. Child body weight and height were measured by trained interviewers at ages 3 and 5 years and waist circumference at 5.³ Parental reports of birthweight and weight at 9 months were obtained at the first interview: the former showed good agreement with that recorded at birth registration. Maternal self-report of weight and height and, if

available, that of her partner has also been obtained at MCS interviews.

Two MCS samples were used for the analyses described in this Briefing. The sample that was used to explore risk factors at age 3 comprised 13,128 singleton⁴ children surveyed at age 9 months (MCS1) and 3 years (MCS2). The analysis of risk factors at age 5 (MCS3) involved 12,354 singleton children interviewed at the first, second and third contacts.

Bivariate logistic regression analyses⁵ were conducted to examine the associations between individual socio-demographic factors and early childhood overweight (including obesity). Associations between dietary factors (including infant feeding), physical activity behaviours and early childhood overweight were examined in greater depth using separate multivariate logistic regression analyses for each factor.

Prevalence of overweight and obesity at ages 3 and 5

At age 3, 23 per cent of MCS children were overweight, including 5 per cent who were obese. By age 5, 16 per cent of children were overweight and 5 per cent obese. Overall, 80.9 per cent of children did not change their body mass index (BMI) category between 3 and 5 years. However, 6.9 per cent of children with a normal BMI at 3 became overweight by 5. Conversely, 10.5 per cent of children who were overweight at 3 had a reduced BMI by age 5, with 8.8 per cent down to a normal BMI and 1.7 down from obese to less severe overweight.

The prevalence of obesity and overweight, as measured throughout by the survey, varied significantly by UK country at both ages (see Figure 1). It was lowest in England and highest in Wales or Northern Ireland. Within England, there were regional differences, with over a quarter of three and five-year-olds in the North East overweight (27% and 26% at 3 and 5 respectively) compared with 19 per cent of three-year-olds in the East of England and 18 per cent of five-year-olds in the South West.

Overweight at age 3

Socio-demographic risk factors

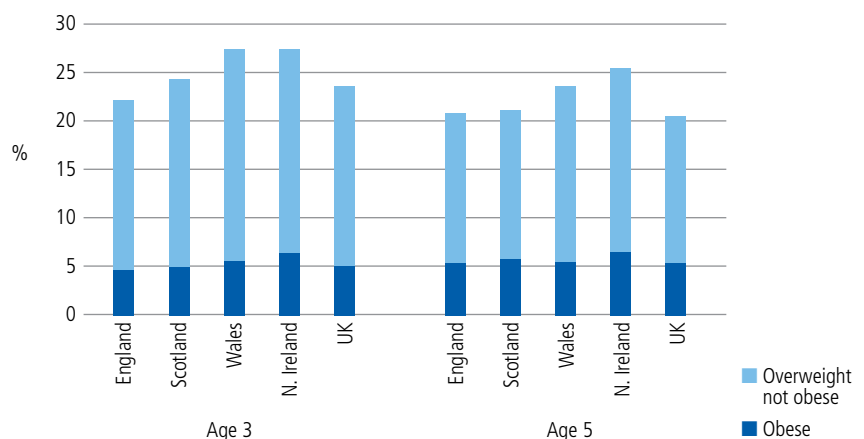
Black children and those with lone mothers were at increased risk of being overweight, while children with Pakistani or Indian mothers were at reduced risk. At this age, the most extreme difference was between black children (30% risk of being overweight) and Indian youngsters (10%). There were no statistically significant associations between the child being overweight and the following characteristics, when taken separately: gender, household income or mother’s socio-economic status (SES), highest academic qualification, or age.

Modifiable risk factors

Dietary factors

Although the UK government recommends exclusive breastfeeding for the first six months, the World Health Organization recommendation in place when MCS children were born was to breastfeed for four to six months before introducing solid foods. Seventy per cent of cohort mothers initiated breastfeeding and, of

Figure 1
Prevalence of overweight (including obese) at ages 3 and 5 by UK country



those mothers, 62 per cent stopped before four months. Additionally, 36 per cent of all mothers introduced solids before four months (see Table 1). These infant-feeding practices were significantly associated with children being overweight at age 3. Children were more likely to be overweight if they were never breastfed, and the risk of being overweight reduced significantly with increasing duration of breastfeeding. This association remained after adjusting for socio-demographic factors. Children were also more likely to be overweight if they were introduced to solid foods before four months.

Sedentary behaviour

Children’s television viewing was reported by parents in the MCS survey at age 3. It was associated with significantly increased risk of being overweight, especially among those watching television for three hours or more a day at this age. However TV viewing, which is more prevalent in poorer households, was measured at the same time as BMI, so a causal relationship between hours spent watching TV at age 3 and being overweight at that age cannot be inferred.

Table 1
Associations between infant feeding and overweight at age 3

| | % of total | % overweight* |
|---|------------|---------------|
| Model 1: Breastfeeding duration | | |
| Never breastfed | 30 | 25 |
| Stopped before 4 months | 42 | 23 |
| Continued until or beyond 4 months | 28 | 20 |
| Model 2: Introduction of solid foods | | |
| Before 4 months | 36 | 26 |
| At or after 4 months | 64 | 22 |

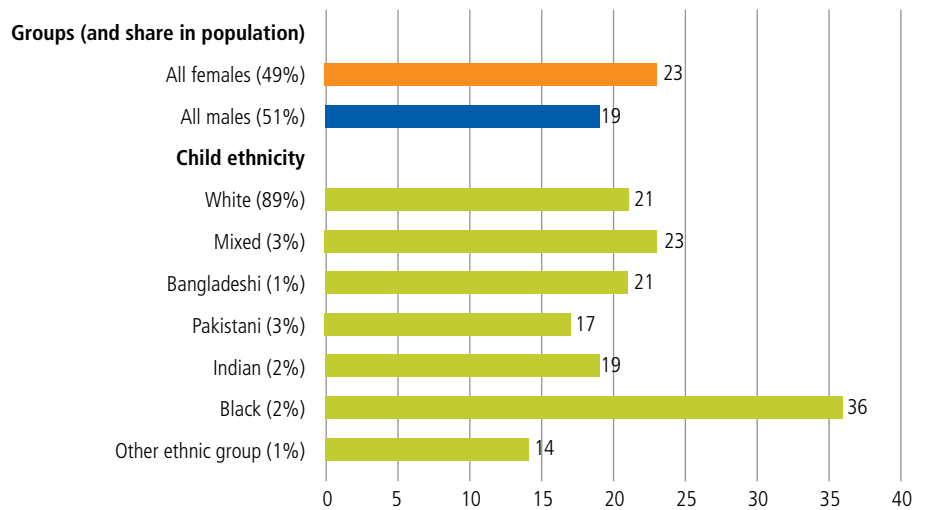
*Includes obese
Base: 13,128 children

Overweight at age 5

Socio-demographic risk factors

When examined individually, socio-demographic factors were also associated with being overweight at age 5 (Figure 2). While there was no gender difference at age 3 in the prevalence of overweight, 23 per cent of girls were overweight by

Figure 2
Percentage of children overweight (including obese) at age 5 by gender and ethnic group



age 5, compared to 19 per cent of boys. Similarly, the risk of being overweight for black children had increased by age 5 (36% compared to 30% at age 3). At age 5 it was Pakistani children who were least likely to be overweight (17%). The risk of being overweight by age 5 was separately and inversely associated with mother’s SES, her educational qualifications, and household income. It was also higher in the offspring of lone mothers. Children of mothers who had their first baby between the ages of 20 and 24 years or over the age of 35 were also at increased risk of being overweight at age 5.

Modifiable risk factors

Dietary factors

Similar associations between infant-feeding patterns and the risk of being overweight were found at ages 3 and 5 (Table 2). Regular meal times at age 3 were not significantly associated with overweight at age 5. More detailed information on dietary habits was collected at age 5, including frequency of eating breakfast, eating and drinking between meals, and fruit consumption. At present we can only examine ‘cross-sectional’ associations between these dietary behaviours and being overweight (because the data were collected at the same point in time). However, it appears that children who do not eat breakfast every day at age 5 are more likely to be overweight. This may be because children who do not eat breakfast may tend to snack on foods that are high in fat and sugar instead.

Table 2
Associations between infant feeding, dietary habits and overweight at age 5

| | % of total | % overweight* |
|------------------------------------|------------|---------------|
| Breastfeeding duration | | |
| Never breastfed | 29 | 23 |
| Stopped before 4 months | 42 | 22 |
| Continued until or beyond 4 months | 29 | 18 |
| Introduction of solid foods | | |
| Before 4 months | 36 | 24 |
| At or after 4 months | 64 | 20 |
| Regular meal times at age 3 | | |
| Never | 2 | 19 |
| Sometimes | 6 | 23 |
| Usually | 45 | 21 |
| Always | 47 | 21 |

*Includes obese
Base: 12,354 children

Physical activity and sedentary behaviour

Children who watched TV/used a computer for at least two hours per day at age 5 were more likely to be overweight at that age (independent of diet and other factors). Again, however, we cannot infer a causal

relationship. Finally, children who generally travelled to and from school by car, bus or other vehicle were also more likely to be overweight at age 5 than those who walked or cycled. Perhaps unsurprisingly, participation in sport or physical activity classes or clubs at age 5 was not associated with overweight status at that age.

Summary of findings

The factors associated with increased risk of being overweight at age 5 included: being a girl, living in a family with a lower household income, and/or having a mother with a lower level of education. Children of lone mothers were also at increased risk of being overweight at ages 3 and 5, as were five-year-olds whose mothers were under the age of 24, or over 35, when they had their first child.

At age 3, children with Indian mothers were least likely to be overweight while black youngsters were at greatest risk. Black MCS babies also experienced the greatest weight gain between birth and nine months (Tate et al. 2006).

Infant-feeding practices were strongly associated with the risk of being overweight at 3 and 5 years. Mothers who breastfed for any length of time, who breastfed for longer than four months, or who deferred the introduction of solids to four months or later, were less likely to have overweight pre-school children, even after allowing for maternal socio-demographic factors.

Conclusions

The research summarised in this Briefing has found significant proportions of overweight young children among this nationally

Key statistics

18 per cent of MCS children were overweight at age 3 and a further 5 per cent were obese.

16 per cent of cohort children were overweight by age 5 and 5 per cent obese.

30 per cent of black MCS children were overweight or obese at age 3, compared to only 10 per cent of Indian children.

23 per cent of girls were overweight by age 5, compared to 19 per cent of boys.

representative cohort. Twenty-three per cent were overweight at age 3, and 21 per cent at age 5. This includes, at each survey, 5 per cent all children who were obese. This risk is socially patterned, with several factors – gender and ethnicity, maternal socio-economic circumstances, education and age at first motherhood, household income, and lone parenthood – all significantly associated with early childhood overweight. Importantly, modifiable factors such as infant-feeding practices were also significantly associated with overweight.

These findings suggest a continued need to promote breastfeeding and discourage premature introduction of solid foods. They also provide more limited support for enhanced nutritional programmes, such as the School Fruit and Vegetable Scheme, and for the current recommendation that all children should participate in one hour of moderate-intensity physical activity each day.

The Foresight report (Government Office for Science 2007) highlighted the complexity of the causes of obesity. MCS data will in future provide invaluable insights into the pathways to obesity and overweight in a large, contemporary and multi-ethnic cohort of children. Comparisons with children in earlier cohort studies will also be possible. Such analyses will help to develop appropriate interventions and policies to prevent and reduce childhood obesity.

References

Government Office for Science (2007) *Foresight Tackling Obesity: Future Choices – Project Report*. London: Government Office for Science.

HM Government (2007) *PSA Delivery Agreement 12: Improve the Health and Wellbeing of Children and Young People*. London: HMSO.

Tate, A.R., Dezateux, C. and Cole, T.J. (2006) 'Is infant growth changing?', *International Journal of Obesity*; 30(7):1094–6.

1 Lucy Jane Griffiths, Summer Sherburne Hawkins, Tim Cole, Catherine Law and Carol Dezateux, Institute of Child Health, University College London. This text has been adapted and shortened to suit the format of these Briefings. Responsibility for any errors therefore rests with the Centre for Longitudinal Studies rather than the chapter authors.

2 This survey used the UK National Body Mass Index (BMI) percentile classification.

3 The definitions of overweight and obesity used here are the International Obesity Task Force cut-offs for BMI, which are age and gender specific.

4 Children born as a result of single, rather than multiple, births.

5 Information on the statistical methods used and the exclusion criteria applied in the construction of the two samples is provided in the book chapter from which this Briefing is drawn. Percentages are weighted to allow for the disproportionate design of the sample and the rates at which different groups of families drop out of the survey.