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'British children are not shrinking', but child height is increasing for the wrong reasons: trends and inequalities in Child Measurement Programme data for England, Scotland, and Wales

Abstract

Background

News media have reported that the average height of British children is falling, but these reports have been contested. Child Measurement Programmes (CMPs) operate in schools in England, Scotland, and Wales, but their height data have been inaccessible, allowing conflicting claims about trends in child height to remain unresolved. Here we aim to describe and explain trends and socioeconomic inequalities in child height using the best available evidence.

Methods

Freedom of Information requests were submitted to relevant authorities in England, Scotland, and Wales, requesting annual CMP height and obesity data, stratified by sex, ethnicity, and deprivation to 2023/24. Mean height and obesity prevalence were plotted against time by age group, sex, and deprivation group.

Results

The covid pandemic prompted school closures in Britain, disrupting CMP data collection. This period was associated with sharp but transient increases in obesity prevalence and mean height. Before covid, mean height increased, particularly among children in deprived areas. Children in deprived areas also showed the greatest increases in obesity and overweight prevalence. Narrowing socioeconomic inequalities in child height in Britain have been associated with widening inequalities in obesity.

Conclusions

This work complements research describing a causal link from child obesity to increased height during childhood, and implies mean height may be an unreliable indicator of child health when obesity is prevalent and rising. In Britain, increases in overall mean child height and narrowing socioeconomic inequalities in child height during the 21st century may reflect widening inequalities in obesity and worsening health among deprived children.

What is already known on this topic

Child Measurement Programmes operate in England, Scotland, and Wales, but their publicly unavailable height data have impaired understanding of trends in UK child height and allowed misleading reports to go unchallenged.

Greater child height is associated with childhood obesity: hormonal pathways are posited to explain why obese children experience accelerated height growth.

What this study adds

Mean height increased sharply during the covid pandemic in Britain, alongside sharp increases in obesity prevalence.

Before the pandemic, mean height increased steadily, with greatest increases among children from more deprived areas, who also showed the greatest increases in obesity.

How this study might affect research, practice or policy

Increases in mean height may not always indicate improved child population health: in Britain these increases may reflect increased obesity and socioeconomic inequalities.

Policies supporting child health in ways that benefit the most deprived are important, as are polices to make the most deprived less deprived.

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Patient consent and ethical approval were not required.

Background

Multiple news reports in 2023 suggested that, on average, children in Britain have been getting shorter. Experts blamed poor national diet, health service funding cuts, and economic austerity. [1, 2] 'The children are shrinking' was an article headline in the British news and current affairs journal, The Economist. [3] In January 2024 the spokesperson for the (then) Prime Minister responded by citing publicly unavailable data from England's National Child Measurement Programme (NCMP), comparing figures for the years 2010 (when the then Prime Minister's Conservative party came to power) and 2021/22, and asserting that this data 'demonstrates growth'. [4] The 'newspaper of record', the *Times*, then declared that 'British children are not shrinking'. [5] But the plot accompanying the *Times* article displayed a recent drop in average height of boys and girls in Britain (see Figure 1a). And reports of the 'national embarrassment' of shorter children continued to appear in 2024. [6, 7] Despite their conflicting narratives, the media attention and Prime Ministerial pronouncements clearly denoted an issue of great public resonance and political relevance.

Child height is an indicator of child health and an important influence on adult health and wellbeing. [8, 9] James Tanner, paediatrician and growth expert, referred to child growth as a 'mirror of the conditions of society', reflecting its many social determinants, including nutrition, childhood illness, psychosocial stress, and socioeconomic context. Tanner's influential growth charts, introduced in the 1960s, required updating in the 1990s to account for increases in the average height of Britain's children during the twentieth century. [10] Historically, child height has increased as social conditions have improved. [11]

A growing body of research suggests a further influence on child height: obesity. Obesity is associated with accelerated linear growth during childhood. [12] It is hypothesised that increased adiposity accelerates growth and puberty through hormonal pathways. [13] Compared with their healthier weight peers, children with obesity tend to be more developmentally advanced, and taller. [14] However, they stop growing earlier, end up no taller as adults, and have an increased risk of morbidity and mortality in later life. [15]

Britain's worsening 'epidemic' of childhood obesity and its widening socioeconomic inequalities have been documented and subject to various policy interventions. [16] Child height has received less attention. Studies have shown that children from deprived areas of Britain tend to be shorter and have greater prevalence of 'stunting' than their more affluent peers. [17, 18, 19, 20] However, the trends over time of child height and its socioeconomic inequalities, and their relation to obesity, have been obscured by a lack of accessible and reliable data.

The news source for recent media reports on child height in Britain was a large global dataset released online. [21] This data was the basis for a journal publication that applied a Bayesian hierarchical model to estimate age trajectories and time trends in mean height and mean BMI for children and adolescents from 1985 to 2019 for 200 countries. [22] Britain was one of the countries included and figures were said to have been obtained from eleven national and subnational surveys that were then used in the model to provide estimates for trends in child height in Britain. The dataset, which was not subject to peer review, was reported to show that since around 2013, average child height in Britain had fallen both in absolute terms and relative to other nations. Plots based on the estimated data were

reproduced in several news reports. However, adding 95% uncertainty intervals to the plots makes it clear that the estimates are inaccurate and the trends are inconclusive: height could be decreasing or increasing (see Figure 1b). The wide uncertainty intervals reflect the limited amount of publicly available source data for child height in Britain resulting in inaccurate estimates from the Bayesian model.

In the absence of reliable and accessible data, inaccurate and conflicting claims about child height in Britain have been reported. Yet reliable child measurement data exist in the countries of Britain, thanks to their Child Measurement Programmes. Our aim in this paper is to describe and explain trends and socioeconomic inequalities in child height in Britain using the best available evidence obtained from Child Measurement Programme data.

Methods

Child Measurement Programmes (CMPs) have been established in England since 2005, Scotland since 2001, and Wales since 2011. Their purpose is to monitor child obesity prevalence as measured by body mass index (BMI = weight / height^2) by routinely measuring the height and weight of every child during their first year of state education. In England, approximately 600,000 children aged 4-5 in their reception year (their first year of compulsory schooling) are measured annually, [23] while smaller numbers are measured in Scotland (50,000 to 55,000) [24] and Wales (30,000 to 35,000). [25] England's CMP also measures children in Year 6, the final year of primary education: a further 600,000 children aged 10-11. Although BMI data derived from these programmes have long been publicly accessible, height data have not.

Because official height data were not publicly accessible, in June 2024 we submitted Freedom of Information (FOI) requests to relevant authorities in England, Wales, and Scotland, asking for CMP height data, with 95% confidence intervals, stratified by sex and area-level deprivation. Subsequent requests were made for updates. The corresponding data for obesity prevalence were already available.

England's Department of Health and Social Care declined our request, stating that they intended to publish the data at a later date. They made limited data available, for boys and girls aged 4-5 (in Reception classes) and 10-11 (in Year 6), without deprivation data. [26] Subsequently, in November 2024, they released age-standardised height data with limited deprivation data. [27] Then, in February 2025, they released a comprehensive age-

standardised height dataset for England, including deprivation data, for the school years 2009/10 to 2023/24. [28] Public Health Scotland provided data for children aged 'around 5 years' (in Primary 1 classes), stratified by sex and area-level deprivation for school years 2001/02 to 2023/24. Public Health Wales provided mean height data for children aged 4-5, stratified by sex and area-level deprivation (with 95% confidence intervals) for the school years 2013/14 to 2018/19. Height data obtained from FOI requests and height and obesity data extracted from websites of relevant authorities are made available (see supplementary file).

We plotted time trends in mean height and obesity prevalence, stratified by sex and area deprivation quintile or decile.

Results

Covid impact

The Covid-19 pandemic led to school closures and significant disruption to CMPs. Schools closed in March 2020 and reopened only later that year: June in Wales, August in Scotland, and September in England. Further school closures occurred between Christmas 2020 and February-March 2021. CMP data collection in the school year 2020/21 was consequently delayed. Comparing CMP data for the years 2019/20 and 2020/21 provides insights into the impact of the pandemic.

In England, local authorities were asked in March 2021 to collect a limited number of measurements and 299,476 children were measured (about a quarter of the pre-pandemic participation) though some local authorities achieved much higher rates. Unlike in previous years, the data were mostly collected in the final term of the school year. Unprecedented increases in mean height were recorded in England during 2020/21 compared to 2019/20. The initial data made available, which were not age-standardised, showed mean height increases for children aged 4-5 (in Reception classes) of 2.9 cm for boys and 3.0 cm for girls. Among children aged 10-11 (in Year 6) the increase was 3.0 cm for boys and 4.1 cm for girls.

Subsequent data released for England were age-standardised. Standardising each child's height in each year of measurement to their exact age of 5.0 or 11.0 years accounted for the measurement delay during the covid pandemic in 2020/21, when children were older and

taller than in previous years. Despite the age-standardisation the covid spike in mean height remained apparent, and its true size was remarkable. Among 5-year-olds mean height increased between 2019/20 and 2020/21 by 0.5 cm in boys and 0.4 cm in girls, strikingly more than the 0.2 cm rise seen over the previous ten years from 2009 to 2019. Among 11-year-olds the increase from 2019/20 to 2020/21 was 1.3 cm in boys and 0.7 cm in girls, compared to rises of 0.7 cm seen over the previous ten years (see figure 2).

Alongside the extraordinary pandemic-related increases in height, the prevalence of child obesity increased substantially in England from 2019/20 to 2020/21. Among children aged 4-5 (in Reception) the percentage who were overweight or obese (categories combined) rose from 22.5% to 26.8% (then fell back to 21.8% in 2021/22). Among children aged 10-11 (in Year 6) the percentage overweight or obese increased from 34.4% to 39.9%.

In Scotland, school closures during the pandemic reduced CMP participation to 44% in 2019/20 and 41% in 2020/21, before returning to pre-pandemic levels (92%) in 2021/22. Child height and obesity data for Scotland show dramatic increases from 2019/20 to 2020/21. Mean height for children aged around 5 (in Primary 1) increased by 2.8 cm for girls and 2.7 cm for boys. Mean height for boys and girls had changed by less than 1 cm during the preceding 15 years. These figures for Scotland are similar to those for England before age-standardisation – age-standardised data are not available for Scotland. Obesity prevalence increased alongside mean height in Scotland. The percentage of all children aged around 5 years who were overweight, obese, or severely obese (categories combined) increased from 15.9% to 21.9% between 2019/20 and 2020/21. This dropped to 17.3% in 2021/22, then to 15.4% in 2022/23.

In Wales, due to the pandemic, no CMP data were available for the year 2019/20, and only limited data for 2020/21 and 2021/22 with data for these years reported to be incompatible with pre-pandemic years for the purposes of comparison. Pre-pandemic levels of data recording and reporting were re-established in 2022/23.

Socioeconomic inequalities

In England's Reception classes, 5-year-old boys in the most deprived decile increased in mean age-standardised height by 0.2 cm over ten years (from 109.8 to 110.0 cm between 2009/10 and 2019/20). There was no increase among boys in the least deprived decile over this period (110.5 cm) (see Figure 3a). Mean age-standardised height also increased by 0.2 cm among 5-year-old girls in the most deprived decile (from 108.9 to 109.1 cm between 2009/10 and 2019/20), while in the least deprived decile it again remained unchanged (109.5 cm) (see Figure 3b).

In England's Year 6 classes, 11-year-old boys in the most deprived decile increased in mean age-standardised height by 0.8 cm over ten years (from 144.4 to 145.2 cm between 2009/10 and 2019/20), while among boys in the least deprived decile the increase was 0.7 cm (from 145.4 to 146.1 cm) (see Figure 4a). Among 11-year-old girls in the most deprived decile mean age-standardised height increased by 1.0 cm (from 145.4 to 146.4 cm between 2009/10 and 2019/20), while among girls in the least deprived decile the increase was 0.5 cm (from 146.0 to 146.5 cm) (see Figure 4b).

While children in England's most deprived deciles showed the greatest increases in height during the pre-Covid era, they also showed the greatest increases in obesity prevalence. Considering the percentage of overweight or obese children (categories combined) from 2007/08 to 2019/20, for children aged 4-5 in Reception it increased in the most deprived decile from 25.2% to 27.4% but decreased in the least deprived decile from 18.8% to 17.4% (see figure 3c). Similarly for children aged 10-11 in Year 6, it increased in the most deprived decile from 36.4% to 42.0% but decreased in the least deprived decile from 26.4% to 24.9% (see figure 4c).

In Scotland, mean height for boys aged around 5 in the most deprived quintile increased by 1.7 cm between 2001/02 and 2019/20, while in the least deprived quintile the increase was just 0.9 cm. For girls too the greatest height increases were seen among more deprived groups. The percentage of Scotland's children aged around 5 classed as overweight, obese, or severely obese increased between 2001/02 and 2019/20 from 15.5% to 20.0% in the most deprived quintile, but decreased from 15.1% to 11.0% in the least deprived quintile (see figure 5).

In Wales, height trends among 4-5 year olds were less clear because the data (not age-standardised) for the pre-covid period covered only six years (2013/14 to 2018/19) and sample sizes were smaller. Still, clear social gradients in height were apparent, with children in the more deprived areas shorter than those in less deprived areas. Mean height for boys in the most deprived deciles increased by 0.2 cm but decreased by 0.3 cm in the least deprived deciles. For girls the trends were similar. Meanwhile, the percentage of children

classed as overweight or obese increased in the most deprived decile from 28.5% to 30.2% and decreased in the least deprived decile from 22.0% to 20.9%.

Discussion

Covid impact on child height and obesity

School closures and home confinement during the covid pandemic resulted in reduced opportunities for physical activity [29] and less healthy diets among British children, especially those more deprived. [30, 31] These socially-determined lifestyle changes would be expected to cause an increase in childhood obesity and this has already been documented and described in England [32] and elsewhere. [33] Covid, the consequent changes to diet, exercise, and the increases in overweight and obesity, were also associated with an increase in mean height in England. Similar trends in child obesity and height in the context of covid lockdowns are suggested by studies in other countries. [34, 35] This is consistent with research suggesting a causal link from child obesity to increased child height. [12, 13, 14] Statistical commentaries accompanying the Government's release of child height data for England implicated increased obesity in the height increases seen during covid, while refraining from a conclusion of causality. They stated:

> 'there was a relatively large increase in average height in 2020 to 2021, which coincided with the large increase in the prevalence of obesity during the pandemic… Evidence from research literature shows that obesity is associated with accelerated height gain in childhood...'[26]

And they reported how their own data supported the height-weight association: for girls and boys aged 5 and aged 11, for all years of data collection, mean height was seen to

increase across BMI categories. That is, BMI categories of underweight, healthy weight, overweight, and obesity, each had progressively greater mean heights. [27]

Britain's child measurement programmes can track changes in child height with high precision, owing to their large number of participants: in England, mean height has a standard error as small as 1 mm. But the possibility of the observed increases in child height being artefactual cannot be entirely excluded. The covid pandemic created challenges for data collection, including measurement delays and reduced participation. Delays meant that children were measured later than usual in the school year, so they were older and taller than in previous years. This deviation from CMP protocols accounted for an unknown component of the greater than expected mean height seen in Scotland in 2020/21. It also accounted for some of the dramatic increase in height between 2019/20 to 2020/21 seen in England before the data were age-standardised. Age-standardisation of England's height data removed the effect of covid delays on measurement consistency and eliminated the artefactual increase in height. Yet even after age-standardisation an unusual increase in height was still seen in England during the covid pandemic.

Reduced participation in CMPs during the covid pandemic introduced the possibility of sampling bias. However, this seems unlikely to explain the results observed in England, since the same trends in obesity and height were seen across all deprivation categories and most ethnic groups (it would be surprising if biases operated equivalently *within* these groups, and biases toward greater or lesser representation *among* the groups would not alter the observed trends). These trends were also seen among many local authorities (including, notably, those that achieved participation rates similar to previous years - local authorities in North Lincolnshire, South Tyneside, and Leeds achieved reception-age participation

around 90% of previous years and their data demonstrate the covid-associated 'spike' in child height, while Brighton and Hove, Medway, and Portsmouth achieved participation among Year 6 pupils of at least 100% of previous years and again their data demonstrate the covid-associated rise in height). A longitudinal study of England's CMP obesity data suggests the pandemic changes were real rather than due to sampling bias. [36] Although participation in child measurement was reduced in England for 2019/20 and 2020/21, thereafter it has pretty much returned to pre-pandemic levels. For children aged 11 (in Year 6) the remnants of the covid height rise remain apparent in these post-covid years. Future CMP data collection may continue to reveal the impact of covid upon child height and obesity prevalence in Britain, while the impact upon adult health may become evident in the years ahead.

Socioeconomic inequalities in child height and obesity

Longer-term trends, based on data for the years before covid, suggest that mean height was increasing in all nations in their first year of education, and at age 11 in England. The greatest increases in mean height occurred among children living in the most deprived areas (based on English, Scottish, and Welsh Indices of Multiple Deprivation). This may have led to reductions in socioeconomic inequalities in height in Britain (while the lack of age-standardised height data for Scotland and Wales impairs our interpretation of the precise scale of overall changes in mean height over time, it seems unlikely to influence the nature of relative changes among deprivation groups). Meanwhile, the greatest increases in obesity prevalence occurred among children in the most deprived areas, leading to increased socioeconomic inequalities in obesity.

Increases in childhood obesity with widening socioeconomic inequalities have already been documented and described for England during the 21st century. [16] Increases in mean height with narrowing of socioeconomic inequalities in height are a novel and unexpected finding. But the increases in height and obesity have occurred to the greatest extent within the same deprived groups, and have occurred within the same social, environmental, and political contexts and they may share the same underlying drivers.

The acute increases in obesity prevalence and mean height seen across the child population of England (and possibly Scotland) during the covid pandemic suggest the chronic changes shaping the health of children in Britain's deprived areas. While so-called lifestyle choices were transiently limited for the entire population during covid, they have been persistently curtailed among deprived groups. Deprived areas have, for example, been shown to have far greater densities of fast food outlets; [37] far less availability of healthy and nutritious groceries; [38] greater risks associated with active travel; [39] fewer, smaller, and more distant playgrounds; [40] and greater spending cuts to children's services that were intended and demonstrated to support healthy weight. [41] Additionally, parents of children living in deprived areas may, for example, have less disposable income for their child's participation in organised sport and be less able to afford the higher prices of more healthy food. [42] At a time of persisting and increasing socioeconomic inequalities and child poverty, overall increases in child height are being driven by increases among children in the most deprived areas, which appear to be driven by their increased obesity.

Conclusion

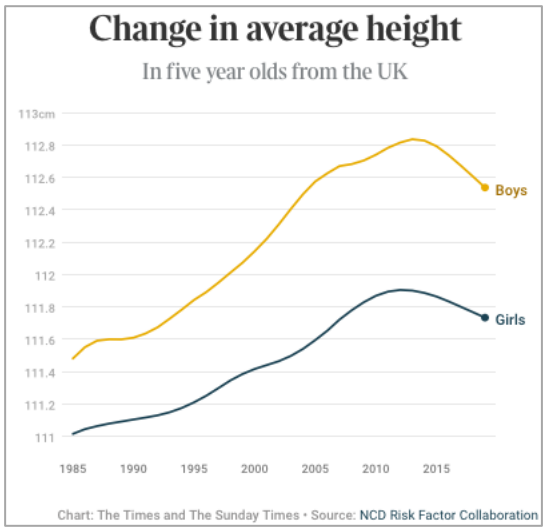
Social, environmental, and political developments in the 21st century have influenced the height and weight of children in Britain. The periods (covid pandemic) and cohorts (children in deprived areas) in which height increases have been greatest are also those in which obesity increases have been greatest. This is consistent with increasing obesity having a causative role in increasing child height.

Media reports of falling child height in Britain have highlighted a subject of evident public and political concern. But inadequately accessible (and age-standardised) data have impaired understanding of trends and inequalities in child height, while preventing scrutiny of pronouncements on the subject. CMP data do not suggest that child height is falling, but the claim, made in January 2024 by the British Conservative Prime Minister's office, that the difference in (unstandardised) child height figures between the years 2010 and 2021/22 'demonstrates growth' was a misrepresentation. Growth was apparent for the wrong reasons: an artefactual rise in mean child height due to discrepancies in data collection during the covid pandemic, combined with the impact on mean child height of a surge in child obesity in the same period. More concerningly, longer term increases in mean height have been driven largely by height increases among children in deprived areas, which may be explained by increases in obesity prevalence among these deprived children.

Further research is required into the interactions of obesity, height, and health during childhood and beyond (and Britain's CMP data, subject to further analysis, may yield further

insights). But contrary to historical patterns, child height may not always be a reliable indicator of child health and improved social conditions, especially when obesity is prevalent and increasing. This has relevance for interpreting global trends, particularly among populations experiencing the double burden of child undernutrition and rising obesity. In Britain, increases in child height may reflect increases in child obesity and the impact of increasing socioeconomic inequalities.

Figures



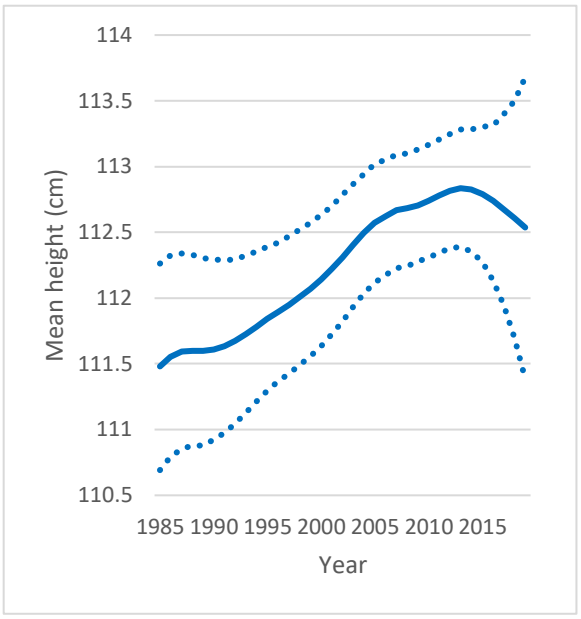
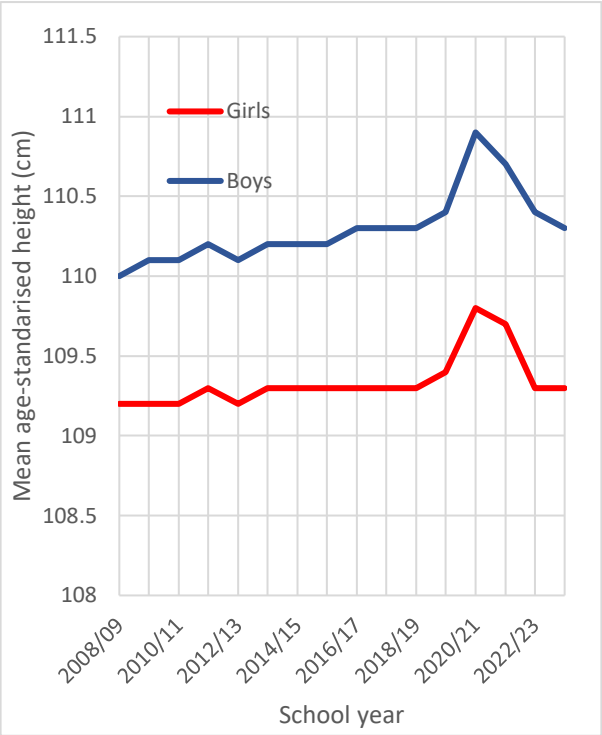


Figure 1. a) *Graph featured in The Times newspaper, 13 January 2024, showing changes in average height of UK five-year-old boys and girls from 1985 to 2019. A decline in average height for girls and boys appears in recent years.*

b) *Changes in mean height of UK 5-year-old boys from 1985 to 2019, plotted using the same data as used in the Times article, obtained from the NCD-RisC dataset, but showing 95% uncertainty intervals for the data. Recent trends are inconclusive: the uncertainty intervals include the possibilities that mean height has decreased or continues to increase.*



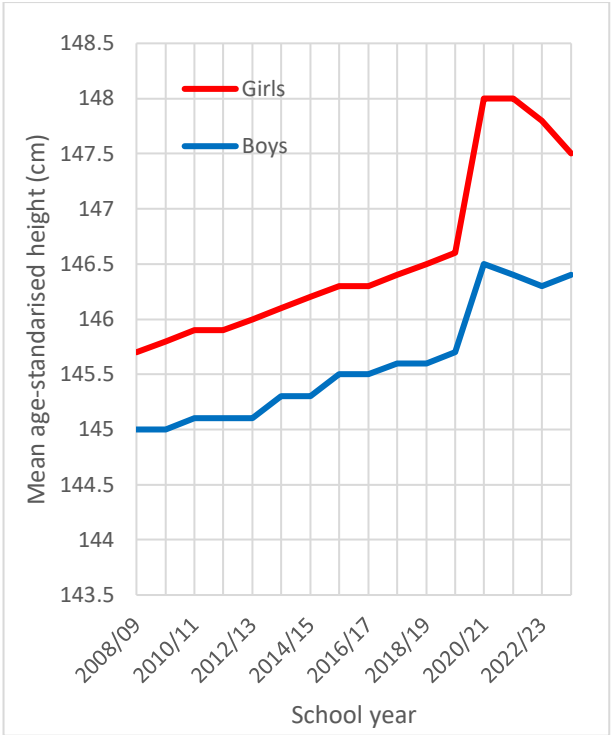


Figure 2. a) *Mean age-standardised height for boys and girls* ***age 5*** *in England, 2008/09 to 23/24. 95% confidence intervals (not shown) are less than 0.1cm and would appear inseparable from the main trend line. Overall height increases are apparent, along with a sharp spike associated with covid in 2020/21.*

b) *Mean age-standardised height, boys and girls* ***age 11****, England, 2008/09 to 23/24. Again, 95% confidence intervals (not shown) follow the main trend line tightly. Overall height increases are seen, long with the sudden rise associated with covid in 2020/21.*

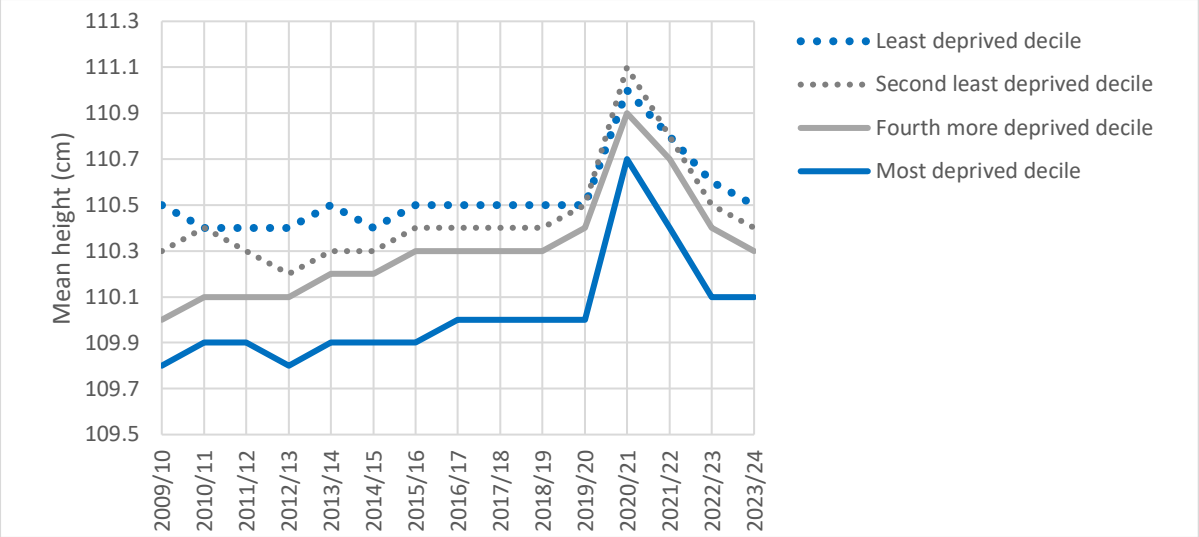


***Figure 3. a**) Mean age-standardised height, 5 year old boys, stratified by area deprivation deciles, England (Note: only the least, most, and 2nd most and 2nd least deprived deciles are shown).*

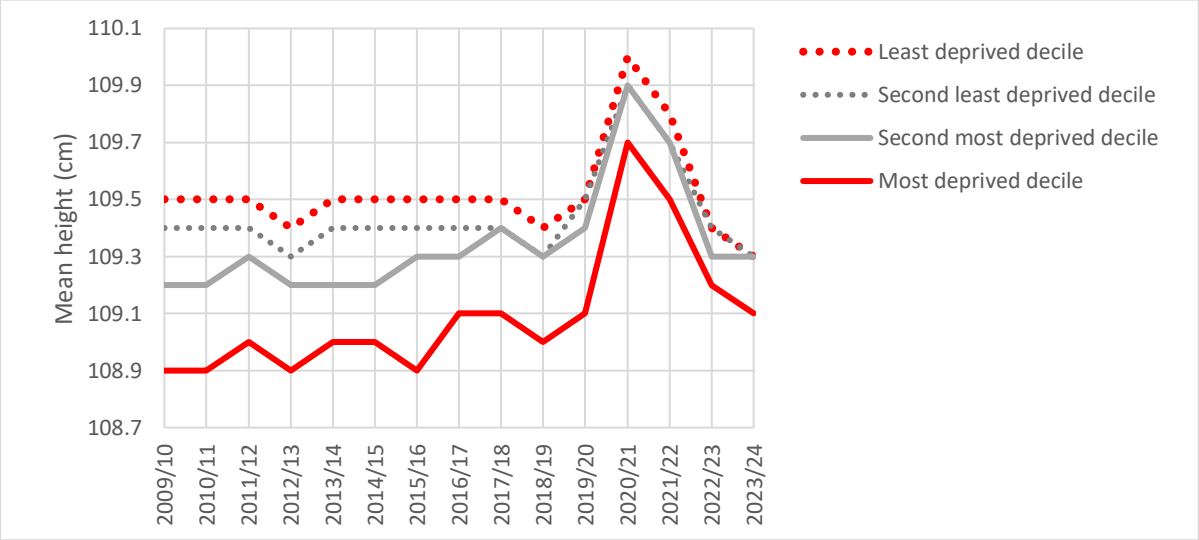


***Figure 3. b**) Mean age-standardised height, 5 year old girls, stratified by area deprivation deciles, England (Note: only the least, most, and 2nd most and 2nd least deprived deciles are shown).*

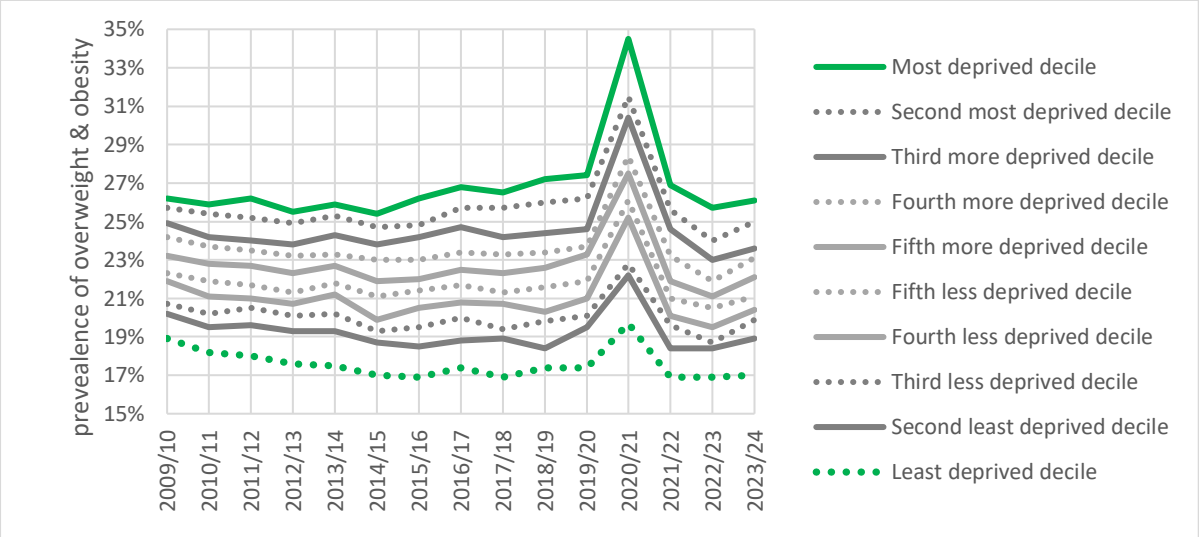


***Figure 3. c)** Percentage of children age 4 to 5 (in Reception class), categorised as overweight or obese, by deprivation decile, England, 2009/10 to 2023/24.*

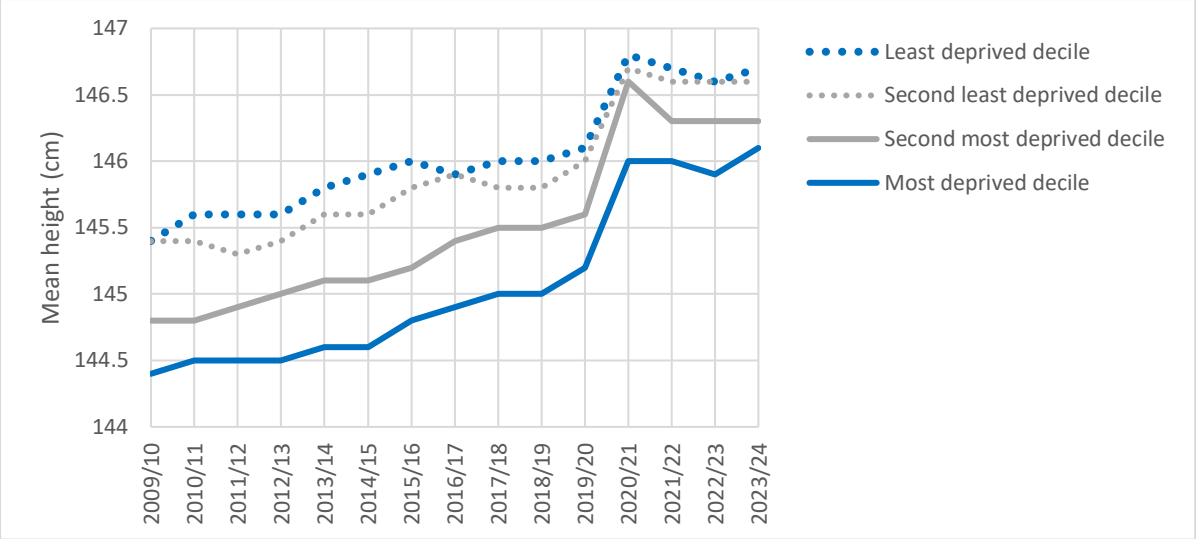


Figure 4. a) *Mean age-standardised height, 11 year old boys stratified by area deprivation deciles, England (Note: only the least, most, and 2nd most and 2nd least deprived deciles are shown).*

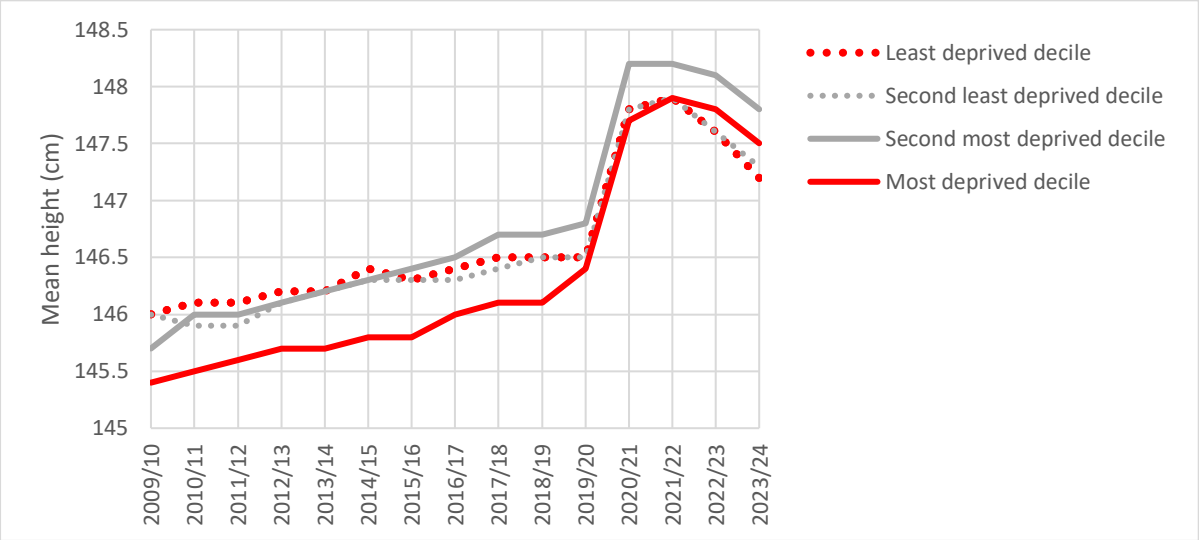


Figure 4. b) *Mean age-standardised height, 11 year old girls stratified by area deprivation deciles, England (Note: only the least, most, and 2nd most and 2nd least deprived deciles are shown).*

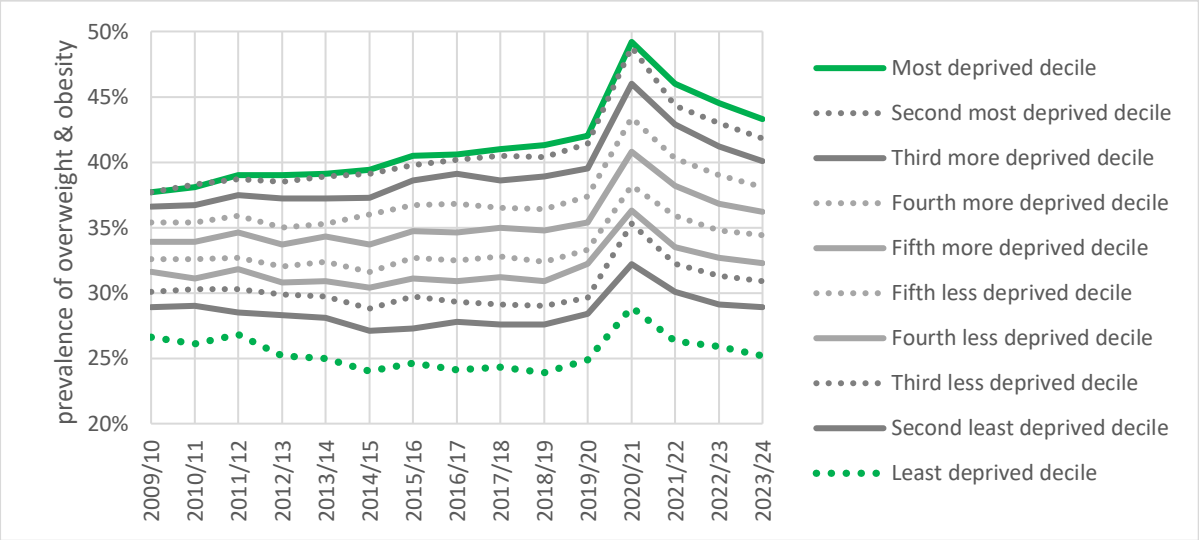


Figure 4. c) *Percentage of children age 10 to 11 (in Year 6), categorised as overweight or obese, by area deprivation decile, England, 2009/10 to 2023/24.*

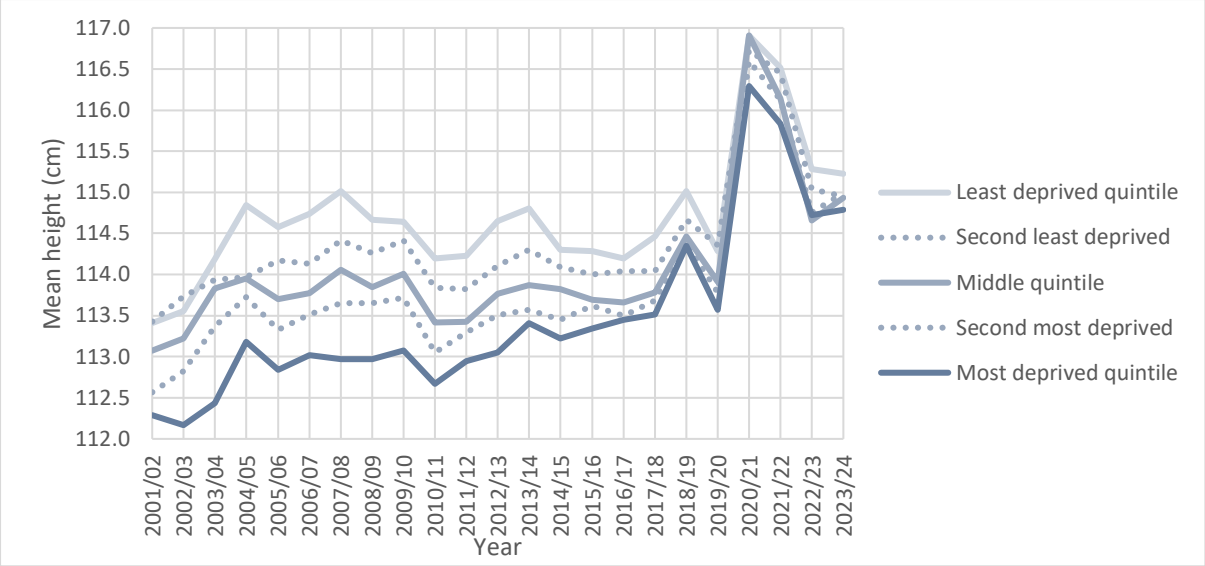


Figure 5. a) *Mean height of boys aged about 5, Scotland, by area deprivation quintile, 2001/02 to 2023/24.*

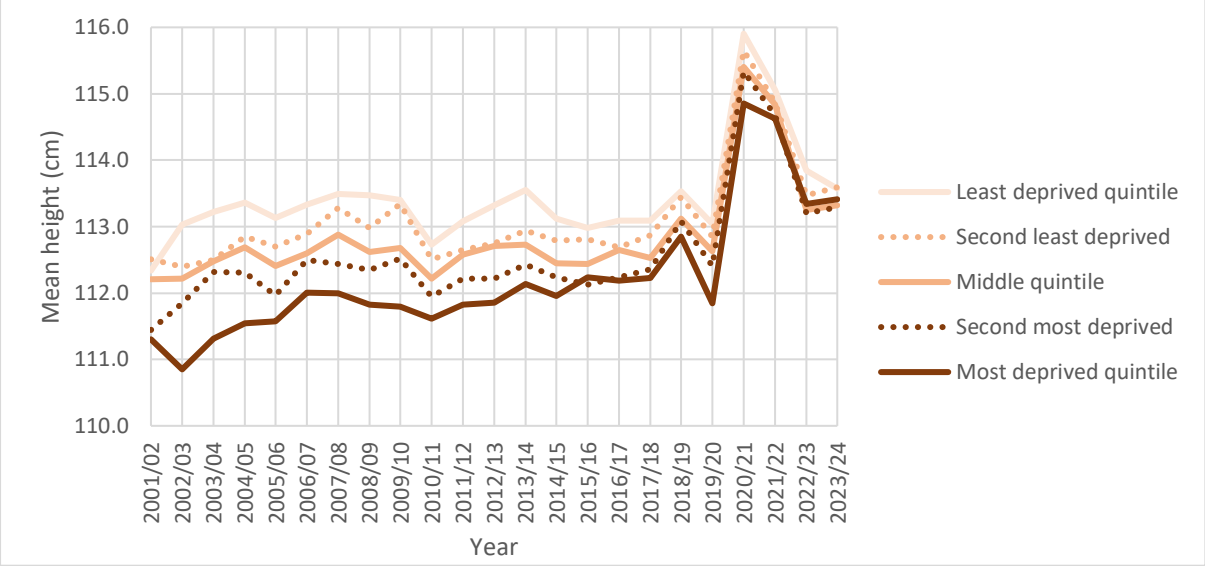


Figure 5. b) *Mean height of girls aged about 5, Scotland, by area deprivation quintile, 2001/02 to 2023/24.*

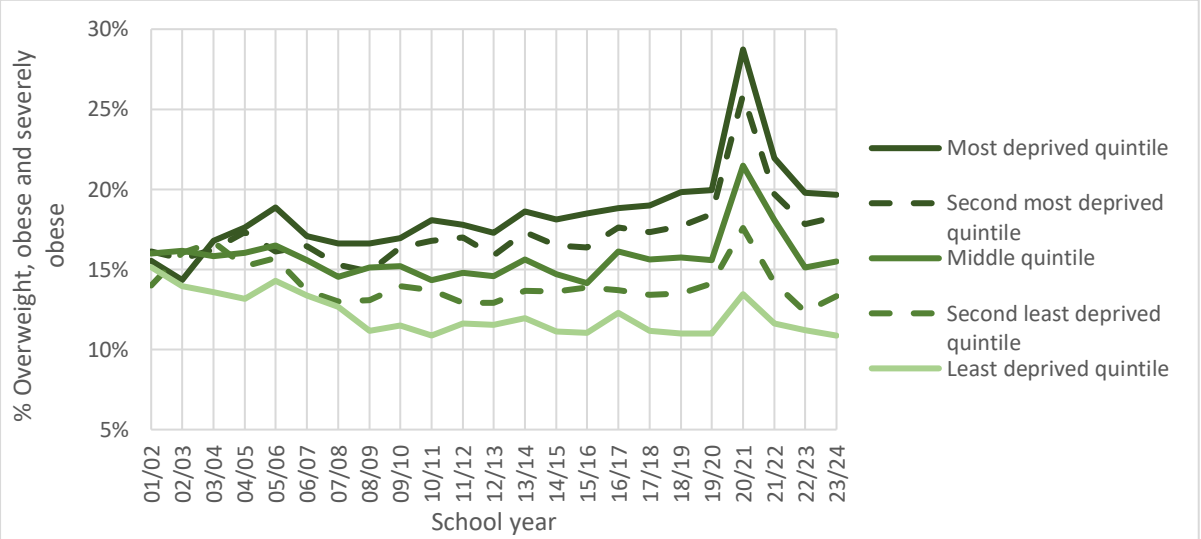


Figure 5. c) *Percentage of children aged about 5 classed as overweight, obese or severely obese (combined) by area deprivation quintile, Scotland, 2001/02 to 2023/24.*

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