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Intergenerational and socioeconomic gradients of child obesity☆

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ABSTRACT

Can the rise in obesity among children be attributed to the intergenerational transmission of parental influences? Does this trend affect the influence of parent's socioeconomic status on obesity? This paper documents evidence of an emerging social gradient of obesity in pre-school children resulting from a combination of both socio-economic status and less intensive childcare associated with maternal employment, when different forms of intergenerational transmission are controlled for. We also estimate and decompose income related inequalities in child obesity. We take advantage of a uniquely constructed dataset from Spain that contains records form 13,358 individuals for a time period (years 2003–2006) in which a significant spike in the growth of child obesity was observed. Our results suggest robust evidence of both socioeconomic and intergenerational gradients. Results are suggestive of a high income effect in child obesity, alongside evidence that income inequalities have doubled in just three years with a pure income effect accounting for as much as 72–66% of these income inequality estimates, even when intergenerational transmission is accounted for. Although, intergenerational transmission does not appear to be gender specific, when accounted for, mother's labour market participation only explains obesity among boys but not among girls. Hence, it appears income and parental influences are the central determinants of obesity among children.

Introduction

The prevalence of obesity among children is rising at alarming rates. Latest estimates from the International Association for the Study of Obesity (IASO, 2011) suggest that overweight (including obesity) among children aged 5–17 years in Spain (33% among boys and 23% among girls) is, together with Greece, Italy and, the UK, among the highest in Europe. Such estimates are especially concerning given its impact on a child's burden of disease in childhood, adolescence and adulthood (Berenson, Srinivasan, Wattigney & Harsha, 1993; Hoffmans, Kromhout & de Lezenne, 1988; Wright, Parker, Lamont & Craft, 2001), and its impact on wellbeing later in life (Gortmaker, Must, Perrin, Sobol & Dietz, 1993; Sargent & Blanchflower, 1994). Obese adolescents are more likely to attempt suicide (Eisenberg, Nuemark-Sztainer & Story, 2003) and to perform worse at school (Schwimmer, Burwinkle & Varni, 2003).

Socioeconomic status is often found to be inversely associated with child and adolescent obesity as measured by high levels of BMI (Case, Lubotsky & Paxon, 2002; Goodman, 1999; Gordon-Larsen, Adair & Popkin, 2003; Wang & Zhang, 2006). In addition, Case, Lee & Paxon (2008), using expanded English and US samples, showed that the income–health gradient for children does indeed increase with age in both countries. Importantly, some evidence suggests an association between child obesity and female employment which is more intense among poorer people (von Hinke Kessler Scholder, 2008).[1] One potential source might lie in the intergenerational transmission process itself (Baum II and Ruhm, 2007).[2]

Unlike obesity in adults, obesity in children is heavily influenced by both parents choice of lifestyles and the overall child's social environment in addition to genetic transmission (Anderson, Butcher & Schanzenbach, 2009; Emanuel, Filakti, Alberman & Evans, 1992). Early studies such as Coate (1983) already reveal that the probability of an adolescent (10–16) being obese increases by 20% if either of his parents is obese. However, with few

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[1] This is in contrast with the US where it appears to be driven by higher socio-economic groups (Anderson et al., 2003).

[2] Interestingly, they find that an additional year of maternal education reduces child body mass index (BMI) by an average of 0.2 kg/m^2.

exceptions, intergenerational transmission is not generally accounted for in studies looking at socio-economic determinants of child obesity. Exceptions include Goode, Mavromaras & Smith (2008) who report that the intergenerational transmission of unhealthy eating habits appears to be more intense amongst individuals in low income households. Currie and Moretti (2007), drawing upon birth records from California, find evidence of a substantial intergenerational correlation of low birth weight, which appears to be stronger for individuals of low socioeconomic status. Propper, Rigg & Burgess (2007) find that a mother in the top quantile of the pre-pregnancy BMI is 15% more likely to have a child with a BMI distribution in the top 10%. Khanam, Nghiem & Connelly (2009) found that maternal health plays an intermediary role so that the socioeconomic gradient in child health disappears when parental health is controlled for. In contrast, Anderson et al. (2009) not only report that obesity rates are 25% higher for disadvantaged children but also find that these children gained weight faster. However, importantly, parent-child elasticity and identifiable environmental factors did not exhibit much difference.[3] Based on this evidence we can conclude that socioeconomic and intergenerational gradients do interact, yet how such an interaction plays out is still inconclusive.

This paper seeks to contribute to the literature by examining the influence of the intergenerational transmission of obesity and its effects on the socioeconomic gradient of obesity. After netting out this influence, we then estimate and decompose the income-related inequalities in child and adolescent obesity. This paper explores the hypothesis of socioeconomic gradients in child obesity as being more acute among children in lower socio-economic households after intergenerational transmission is accounted for, and hence whether it furthers the income gradient in children's health. We rely on unique data from one country (Spain) over two points in time where we observe a sharp increase in child obesity. It is our contention that this strategy should allow us to disentangle the extent to which the rise in childhood obesity, and its underpinning socioeconomic gradient, result from a specific combination of parental obesity, tighter budget restrictions, education and maternal employment. Secondly, the paper contributes by examining the socioeconomic gradients of obesity and overweight in children. We have estimated the concentration index, the income elasticities and factor decomposition between 2003 and 2006 before and after controlling for the transmission of obesity and overweight. The reminder of the paper is as follows: In Section 2 we report existing evidence and background. Section 3 highlights the empirical methods employed, Section 4 and 5 are devoted to data and results and Section 6 concludes.

Intergenerational and socioeconomic obesity gradients

Pure intergenerational gradients

Parents can influence their children's weight both directly through their genetic influence and environmentally, given that parents' food choices are learned by their children and are so repeated over time. Goode et al. (2008) finds using Scottish data that the paternal history of eating habits has no impact on either sons or daughters while the maternal history influences negatively the eating behaviour of daughters.

The medical literature refers to the so-called "child to adult body mass" effects (Lake, Power & Cole, 1997; Whitaker, Wright, Pepe, Seidel & Dietz, 1997). Ahlburg (1998) reports estimates of intergenerational correlations for life spans between parents and children in the range of 0.15–0.3. Classen and Hokayem (2005) find that children of extremely obese mothers (with BMI greater than 40) are 50% more likely to be obese than their counterparts with mothers having BMI levels in the recommended range of 18.5–25 kg/m^2. Similarly, Classen (2010) finds an intergenerational correlation of BMI between female children and their mothers of 0.38 relative to a BMI correlation of 0.32 between mothers and their sons, and children of obese mothers are found to be 38% more likely to be overweight or obese. Monherit, Vistnes, and Rogowski (2009) finds evidence of parental body weight influencing adolescents' body weight. This result contrasts with an earlier study by Coate (1983) showing that while parental obesity does influence child and adolescent weight, diet is unrelated to these outcomes so only genetic transmission matters. By contrast, Anderson, Butcher & Levine (2003) finds that a mother's BMI is strongly related to child overweight. However, how do such important intergenerational effects influence the socio-economic gradient in child obesity?

Socioeconomic and intergenerational gradients

A long-lasting literature (Case, Fertig & Paxson, 2005; Case et al., 2008; Currie & Hyson, 1999; Currie, Shields & Wheatley-Price, 2004; Currie & Stabile, 2003) has documented a family income gradient in child health. However, its interpretation is controversial (Abernathy, Webster & Vermeulen, 2002). One explanation lies in that socially disadvantaged individuals are found to have less autonomy to choose healthy behaviours (Wickrama, Conger, Wallace & Glen, 1999). More specifically, as applicable to child obesity there is some evidence that indicates evidence of pro-rich socio-economic inequalities (Armstrong, Dorosty, Reilly, et al., 2003; Kinra, Nelder & Lewendon, 2000) intermediated by parent's education influences as well as mother employment (Anderson et al., 2003; Cawley & Liu 2007), parental control of adolescent diets does exert an influence on adult obesity (Crossman, Sullivan & Benin, 2006) as well as other unobserved parental factors (Dooley & Stewart, 2007).

Finally, Anderson et al. (2009) finds that the intergenerational BMI elasticity between women and their children has increased from 1971 to 2004, but that importantly it does not vary significantly between families of different income levels when intergenerational gradient is accounted for.

Methods

Measurement of childhood obesity

We measure childhood obesity by means of parents' self-reported data on their child's height and weight allowing us to define the "body mass index" (BMI) indicator as weight in kilograms divided by the square of height in metres. Given the difficulties of straight BMI as a measure of adiposity among children, we follow two alternative methods to measure childhood obesity. First, we rely BMI cut-off points corresponding to the 97th (85th) centile for obesity (overweight) as in Sobradillo, Aguirre, Aresti, et al. (2002) also known as 'Orbegozo Foundation' tables. Second, we also employ the age and sex specific BMI cut-off points calculated by Cole, Bellizzi, Flegal & Dietz (2000) for children aged 2–18 years

[3] However, the exact sources affecting the transmission of an individual's health behaviour are contentious. Generally, intergenerational transmission is measured by examining the correlation between children's and parents health. If the overall correlation has increased over time, this suggests that something in the common environment (or related to the decisions made by the family) is affecting all family members. On the other hand, if the correlation has decreased over time, then this suggests a larger role for something unique to the environment those children – but not their parents – face, for example something present in childcare settings or public schools.