A complex relationship between ethnicity, socio-economic status and the risk of child obesity/overweight in the UK

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Short Abstract

A range of studies report a robust association between family socio-economic status and the prevalence of child obesity as children from poorer backgrounds are, on average, more likely to be obese than children from more advantaged families. However, some recent studies have suggested that the relationship between disadvantage and the prevalence of childhood obesity might be more complex than previously supposed. Studies in the U.S. have shown that for ethnic minority children the income gradient in child overweight/obesity is either non-existent or reversed, suggesting that we should be careful in assuming that higher socioeconomic status is protective (against obesity) for all groups of the population. In this paper, we aim to contribute to this emerging stream of research by analysing these issues in the U.K., where research on this topic has been rather limited so far but where rates of obesity are particularly high for children of ethnic minority parents.

Introduction

In the U.K., obesity has become increasingly common in children over the last two decades and it is now considered a major area of research and target for policy intervention (Griffith, Hawkins, Cole, Law, & Dezateaux, 2010). Existing evidence documents that the prevalence of overweight/obesity is not uniformly distributed across population subgroups, and a range of studies report a robust association between family socio-economic status and the prevalence of child overweight/obesity. Children from poorer backgrounds are, on average, more likely to be overweight/obese than children from more advantaged families (Griffiths, Hawkins, Cole, & Dezateux, 2010). This pattern has been attributed to the fact that children from poorer backgrounds tend to have worse dietary patterns, are less likely to engage into physical activity and more likely to be sedentary and their mothers have worse health behaviours during the ante-natal and post-natal periods (Goisis, Sacker, & Kelly, 2015).

However, some recent studies have suggested that the relationship between disadvantage and the prevalence of childhood obesity/overweight might be more complex and varied than previously supposed. A few studies (Martinson, McLanahan, & Brooks-Gunn, 2012; Odgen, Lamb, Carroll, & Flegal, 2010; Van Hook & Stamper Balistreri, 2007) in the U.S. have shown that for Hispanic and African American children the income gradient in child overweight/obesity is either non-existent or reversed compared to what is observed on average or for the White population. In the U.K., one study (Martinson et al., 2012) reveals similar findings for children of Black African and Caribbean mothers. These studies suggest that we should be careful in assuming that higher socioeconomic status is protective against overweight/obesity for all groups of the population and that these complexities should be further investigated and understood. Researchers have suggested some potential explanations for variations in the effect of income on overweight and obesity. For example, amongst ethnic minority groups, low education and income might be associated with family practices (such as home cooked meals using more traditional ingredients) that are actually protective against child overweight. Another option is that ethnic minority and, in particular, parents with immigrant backgrounds from less privileged countries might consider higher weight (for them and for their children) as associated with wealth and economic success (Martinson et al., 2012). Although these explanations are plausible, they have not, to our knowledge, been tested empirically.

In this paper, we aim to contribute to this emerging stream of research by analysing these issues, and in particular by testing these explanations more explicitly in the U.K., where research on this topic has been rather limited so far. We believe that expanding this body of knowledge in the U.K. is relevant because child overweight/obesity is considered a major public health concern and, importantly for this study, its rates are particularly high for children of ethnic minority parents (Brophy et al., 2009).

Therefore, the design of effective policy interventions and strategies to reduce the prevalence of obesity and overweight amongst children of ethnic minority would benefit by research investigating what factors are (and those that aren't) driving these differentials.

Data & Methods

The Millennium Cohort Study

This paper uses data from the Millennium Cohort Study (MCS). The MCS is a U.K. nationally representative prospective cohort study of children born in 18552 families in 2000-2001 (Hansen, 2008). The sample population was drawn from all live births in the U.K. from September 2000 in England & Wales and 1 December 2002 in Scotland & Northern Ireland. The sample was selected from a random sample of electoral wards with a stratified sampling strategy to ensure adequate representation of all four U.K. countries, disadvantaged and ethnically diverse areas. The first Sweep was collected when the cohort children were around 9 months and the subsequent four Sweeps were collected at intervals of roughly two years. To account for the complex structure, survey weights are used throughout the analyses.

The MCS is an appropriate data source to address our research questions as it provides information on families' socio-economic status, children's adiposity as well as markers of diet, physical activity at different points of their life course that allow us to begin to unpack and explain inter-ethnic variations in the relationship between income and child obesity. The analyses focus on Sweep 4 of the MCS, which was collected when children were around 7 years of age. We focus on this Sweep since it comes after the adiposity rebound which takes place around age 5, but the sample is young enough that the home environment is still very important. We will report as Appendix material results obtained on Sweep 3 and Sweep 5 (taken, respectively, when children were 5 and 11 years old).

Method

First, we begin by inspecting socio-economic gradients in child overweight/obesity by ethnicity in the U.K. to assess whether, similarly to what is observed in the U.S., socio-economic status might operate differently for non-White children. Second, we analyse, separately for ethnic groups, socio-economic gradients for a set of risk factors that have been identified as relevant for child overweight/obesity with the aim of contextualising the results of the first set of analyses. Namely, should the analyses reveal a lack of a gradient for (some) ethnic minority groups (or a reverse association compared to the average population), the second set of analyses investigate inter-ethnic differences in the way socio-economic status is associated with risk factors for overweight/obesity. Third, we run a series of logistic regression models to examine the association between child overweight/obesity (the dependent variable), ethnicity and socio-economic status. These models include interaction effects between ethnicity and socio-

economic status and a set of control variables such as mother's nativity, the child's gender and birth weight. We will separately and progressively control for the risk factors.

Variables

Obesity and overweight were defined using the International Obesity Taskforce (IOTF) cut-offs for BMI (Cole, Bellizzi, Flegal, & Dietz, 2000), which are age and gender adjusted. BMI is expressed as weight in kilograms divided by the square of height in meters (BMI: kg/m^2). To measure socio-economic inequalities in child obesity and overweight, we use quintiles of family income obtained using the modified OECD scale which sets the family's needs relative to those of a couple with no children. We categorize families as low income if they belong to the bottom three quintiles and high income if they belong to the top two income quintiles. The results are qualitatively similar if we categorized families as being high income if they belong to the top 30% of the income distribution.

On the basis of previously reported associations with child obesity and overweight, we focus on 12 risk factors reflecting three broad aspects of the family environment (Goisis et al., 2015). To capture the mother's health-related behaviours during pregnancy and after birth, we considered whether the mother smoked during pregnancy (Griffiths et al., 2010), duration of breastfeeding (Arenz, Rückerl, Koletzko, & von Kries, 2004; Harder, Bergmann, Kallischnigg, & Plagemann, 2005) and whether the child was introduced to solid foods before four months(Brophy et al., 2009; Hawkins, Cole, Law, & Group, 2009). To capture children's level of physical activity and sedentary behaviours, we considered the frequency of sport/exercise (Connelly, Duaso, & Butler, 2007) active playing with a parent, hours watching TV (Reilly et al., 2005) hours playing with PC (Vandewater, Shim, & Caplovitz, 2004) and bedtime (Reilly et al., 2005). To capture the dietary environment in which children were growing up with, we considered whether the child skipped breakfast (Krebs et al., 2007), fruit consumption (Griffith et al., 2010), sweet drinks consumption (Ng, Ni Mhurchu, Jebb, & Popkin, 2012) and the mother's BMI (Kelly & Bartley, 2010).

We divide respondents into four ethnic groups, based on the cohort child's mother reported ethnicity at Sweep 1 interview, namely White, Indian, Pakistani and Bangladeshi, and Black Caribbean and African. Ideally we would analysed each ethnic group separately (because of their different migration and settlement histories in the UK, different cultural practices etc.) but sample size issues precluded it.

Preliminary Results

We report a descriptive table showing socio-economic gradients in obesity (Table 1) and overweight/obesity (Table 2) by ethnicity when the cohort child was around 7 years old (Sweep 4 of the MCS). The results show that, as expected, White children from lower income families are more likely to

be obese and overweight/obese at age 7 compared to White children from higher income families. In contrast, and consistent with evidence from the U.S., children of Black Caribbean and African mothers from more disadvantaged families are *less* likely to be obese and overweight/obese at age 7 than their more advantaged counterparts. A consistent pattern is not observed for children of Indian and Pakistani/Bangladeshi mothers. These patterns were robust to different income specifications. This first set of analyses confirm that the association between socio-economic status and child obesity/overweight is heterogeneous across ethnic minority groups – the rest of the paper will build and expand on these results with the aim to better understand why this is the case.

Table 1: % with obese children by ethnic group, by income quintiles

	White	Indian	Pakistani & Bangladeshi	Black African & Caribbean	Total
Sweep 4					
Bottom, second, third quintiles	6.4%	3.7%	9.7%	13.8%	7.1%
Fourth, Top quintiles	4.5%	6.3%	6.1%	18.5%	4.8%
Ratio	1.4	0.6	1.6	0.7	1.5
N	11,089	321	795	386	12,591

Table 2: % with overweight/obese children by ethnic group, by income quintiles

	White	Indian	Pakistani & Bangladeshi	Black African & Caribbean	Total
Sweep 4					
Bottom, second, third quintiles	21.2%	22.2%	21.8%	29.4%	21.6%
Fourth, Top quintiles	18.7%	23.1%	27.0%	46.2%	19.5%
Ratio	1.1	1.0	0.8	0.6	1.1
N	11,089	321	795	386	12,591

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