



Obesity and skill attainment in early childhood

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ABSTRACT

This paper investigates the association between obesity and skill attainment in early childhood (aged 2–3 years). Data from the German Socio-Economic Panel Study are used to estimate models of developmental functioning in four critical areas (verbal skills, activities of daily living, motor skills, and social skills) as a function of various measures of weight (including body mass index and obesity) controlling for a rich set of child, parent, and family characteristics. The findings indicate that, among boys, obesity is associated with reduced verbal skills, social skills, motor skills, and activities of daily living. Among girls, obesity is associated with reduced verbal skills. Further investigations show that the correlations exist even for those preschool children who spend no time in day care, which implies that the correlations cannot be due solely to discrimination by teachers, classmates, or day care providers.

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1. Introduction

In developed countries, obesity tends to be associated with worse labor market outcomes; in particular, lower wages or earnings (Cawley, 2004; Cawley et al., 2005; Brunello and D'Hombres, 2007; Lundborg et al., 2007), less wealth (Zagorsky, 2005), and a lower probability of employment (Paraponaris et al., 2005; Lundborg et al., 2007; Morris, 2007; Burkhauser and Cawley, 2008). Several papers have found evidence that the relationship is causal (e.g. Cawley, 2004; Cawley et al., 2005; Morris, 2007).

Obesity may worsen labor market outcomes for several reasons, including discrimination by employers or lower productivity due to worse health. Another possibility is that childhood obesity, which is a strong predictor of adult obesity,² leads to less skill formation and therefore lower productivity in adulthood (Sabia, 2007; Lobstein et al., 2004). An obese child might attain fewer skills for several reasons; e.g. obesity-related illness may impair skill acquisition, there may be discrimination by teachers, day care providers, or classmates, or high-ability parents may be better producers of both skills and health in their children.

This paper tests whether childhood obesity is associated with lower skill attainment, at younger ages (2–3 years) than previously examined. This research question is timely because the prevalence of childhood obesity has risen rapidly in many countries (Lobstein et al., 2004; Kurth and Schaffrath Rosario, 2007; Ogden et al., 2002; WHO, 2005), which has led some to

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² Roughly 20% of obese adults were obese as children (estimates range from 5 to 44%) and the probability of becoming an obese adult is roughly 400% greater for obese children than non-obese children (estimates range from 200 to 650%); see Freedman et al. (2005) and Serdula et al. (1993).

describe childhood obesity as a pandemic (Malecka-Tendera and Mazur, 2006; Kimm and Obarzanek, 2002). This research is also timely because it contributes to the growing literature on early-childhood health and skill formation (e.g. Heckman, 2008; Heckman, 2007; Cunha et al., 2005).

Previous studies of whether childhood overweight is associated with lower skill attainment have focused largely on children of elementary school age (Datar and Sturm, 2006; Cairney et al., 2005; Datar et al., 2004; Graf et al., 2004; Mo-Suwan et al., 1999) or those about to enter elementary school (Mond et al., 2007). To our knowledge, this is the first study of obesity and skill attainment to study children as young as 2–3 years old. Studying pre-school children is informative because if obesity is associated with skill attainment prior to school entry, it suggests that it cannot solely be due to discrimination by schoolteachers or classmates.

Several studies have examined how childhood obesity correlates with academic outcomes. A study of nationally representative U.S. data on kindergarten children found a negative correlation between overweight status and test scores on math and reading exams, but these differences tended to become insignificant after controlling for socioeconomic and behavioral characteristics (Datar et al., 2004). A study of children and adolescents in Thailand found that overweight was associated with significantly lower grade point average among young adolescents (grades 7–9) but not younger children (grades 3–6) (Mo-Suwan et al., 1999). A study of nationally representative Icelandic data of 14- and 15-year old schoolchildren found that body mass index (BMI) was significantly and negatively correlated with grades in three language classes and mathematics (Sigfusdottir et al., 2007). Among older youths (aged 14–17) in the U.S., a negative relationship between BMI and grade point average has been documented among white girls, but not nonwhite girls or males (Sabia, 2007). A large literature has documented discrimination against obese students by classmates, teachers, and administrators; see the reviews by Puhl and Latner (2006) and Puhl and Brownell (2001).

Other research has examined the relationship between childhood overweight and motor skills. A study of first-grade children in the Cologne region of Germany found that obesity was associated with impaired motor development for both boys and girls (Graf et al., 2004). A study of elementary school children aged 9–14 years in a city in Ontario, Canada found that Developmental Coordination Disorder is a risk factor for overweight and obesity for boys but not girls (Cairney et al., 2005). A study of children aged 4.4–8.6 years in Lower Bavaria in Germany found that obese male (but not obese female) children were more likely to have impaired gross motor skills (Mond et al., 2007).

This paper tests whether childhood obesity is associated with lower skill attainment on four dimensions: verbal skills, activities of daily living, motor skills, and social skills. To our knowledge, our sample of children is younger than that used in any previous study of this question. In contrast to previous studies based on German data (Graf et al., 2004; Mond et al., 2007), a nationally representative data set is used.

2. Data and methods

2.1. Data: German Socio-Economic Panel Study (SOEP)

The sample consists of children between the ages of 26 and 44 months who are the offspring of respondents to the German Socio-Economic Panel Study (SOEP). The SOEP is a wide-ranging nationally representative longitudinal study of private households that includes information on all household members and includes Germans living in West and East Germany, foreigners, and recent immigrants (Wagner et al., 2007); for more information see the SOEP webpage at: <http://www.diw-berlin.de/english/soep/soepoverview/27908.html>. The SOEP was started in 1984 and in 2006 it included more than 20,000 individuals in nearly 11,000 households. SOEP data are collected in varying ways from respondents: oral interviews, written questionnaires, and computer-assisted interviews; the way in which the mother-child questionnaire data (which are the main source of this study) were collected is not indicated.

2.2. Child body mass index, overweight, and obesity

Since 2002 the SOEP has included questions on the health (including weight) of adult respondents (see e.g. Cawley et al., 2005 and Heineck, 2006). In addition, mother's reports of the weight and height of children have been collected since 2003. A substantial body of research has studied the accuracy of parental reports of child weight; in general, this literature finds that parents tend to underreport the weights of relatively heavy children and therefore obesity is underestimated (Scholtens et al., 2007; Wing et al., 1980; Davis and Gergen, 1994). Huybrechts et al. (2006) finds no difference in the accuracy of parental reports across the gender of the preschool child. Several studies conclude that parental reports of child weight are sufficiently accurate to be used in research (Garcia-Marcos et al., 2006; Sekine et al., 2002; Goodman et al., 2000).

Reporting error by mothers in Germany may be less than in other samples because, in Germany, preventive medical check-ups for very young children are offered on a regular basis starting at birth and are free of charge. Weight and height at each check-up are documented in a medical record booklet that is kept by the family. 98% of SOEP children had such check-ups, so to the extent that mothers referred to these booklets when reporting child weight and height to the SOEP, reporting error in mother's report of child weight and height are presumed to be small.

Clinical weight classifications were defined using the standard reference values for German children (Kromeyer-Hauschild et al., 2001): overweight is above the historic 90th percentile, and obesity is above the historic 97th percentile, of BMI. These reference values are used by major German studies of childhood overweight (e.g. Kurth and Schaffrath Rosario,

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