



# The long-run effect of education on obesity in the US



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## ABSTRACT

The proportion of obese population has been gradually increasing in the US over the past few decades. In this study I investigate how education is associated with Body Mass Index (BMI) in later stages of life. BMI,  $\text{weight}(\text{kg})/\text{height}(\text{m})^2$ , is the principle measure used for classifying people as obese. Using sibling data and methods that take account of unobserved endowments and environment shared by siblings, I find that there is large variation in BMI between siblings and that education is negatively associated with BMI. One more year of schooling is associated with an estimated reduction of 0.15 in BMI. When considering different education levels, completing college education is associated with 0.7 reduction in BMI relative to high school graduation only. The significant effect of education on obesity that remains in the long-run has policy implications.

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## 1. Introduction

Obesity prevalence has been steadily increasing in the United States since 1960, when the National Health and Nutrition Examination Survey started to collect data on health and nutritional status of adults. The recent instance of this survey shows an adult obesity rate in 2011–2012 of 34.9%, which is in stark contrast to figures from the earlier surveys. For example, the adult obesity rate was 14.4% in 1976–80 and 22.3% in 1988–1994. The state level data from the Behavioral Risk Factor Surveillance System also show the spread of an obesity epidemic over the last 20 years. In 1990 the highest obesity rate among 45 states was 14%, but in the 2010 survey, 12 states had an obesity rate of 30% or higher.<sup>2</sup> Given the evidence that various diseases

and adverse health conditions are associated with obesity (Waalder, 1984; National Institutes of Health, 1998), policy makers and researchers have responded to this growing incidence of obesity by developing plans and targets, as in Healthy People 2020,<sup>3</sup> to monitor and promote better public health.

One issue of interest to economists is the observed inequality in overweight and obesity status by education level. The raw data show that obesity is more prevalent among the low educated in the US and other developed countries (Ogden et al., 2010; Cohen et al., 2013), indicating negative correlation between educational attainment and obesity. The correlation between education and obesity, however, may come through three different channels, each having different implications for empirical analysis and policy prescription. First of all, the negative correlation between education and overweight status can be driven by benefits of schooling. Education may induce people to understand the consequences of obesity more

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<sup>2</sup> The statistics in this paragraph comes from the National Health and Nutrition Examination Survey (NHANES) and the Behavioral Risk Factor Surveillance System (BRFSS).

<sup>3</sup> The Healthy People initiative was started by the US department of health and human services in 1979. One of the goals of the Healthy People 2020 is to achieve health equity, eliminate disparities, and improve the health of all groups.

easily and help people lead a healthy lifestyle through, for example, restricted diet, regular exercise and routine health check-up as documented by Kenkel (1991), Park and Kang (2008), Fletcher and Frisvold (2009), Lleras-Muney and Cutler (2010), and Eide et al. (2011). Second, the correlation might be induced by reverse causality. That is, having good health in terms of having optimal weight for height may have facilitated educational attainment (Grossman, 2004; Ding et al., 2006). Last but not the least, there may be other factors that influence both schooling and health status such as genetic or other characteristics that may not be readily measurable.

There have been concerted efforts in the economics literature to identify the causal effect of schooling on obesity, based on an understanding of these mechanisms, but empirical findings are inconclusive with regard to the extent of the effect. For instance, Kenkel et al. (2006), using the National Longitudinal Study of Youth 1979, find little evidence for an effect of high school completion or receipt of GED (General Educational Development High School Equivalency Diploma) on the probability of being overweight or obese. Using twin data from the National Survey of Midlife Development in the United States, Lundborg (2013) finds no causal effect of schooling on body size. Grabner (2008), in contrast, finds substantial effect of schooling on obesity by using the National Health and Nutrition Examination Survey. The literature which examines data from other parts of the world also finds mixed results. Webbink et al. (2010) find significant effect of schooling for Australian men. Kemptner et al. (2011) find that extended years of compulsory schooling reduce the chance to develop weight problems for people in West Germany. Brunello et al. (2013) and Atella and Kopinska (2014) also find substantial schooling effects on obesity for women living in Italy and other European countries. Clark and Royer (2013) focus on obesity and other health outcomes in the UK and Arendt (2005) for Denmark but both studies find no significant effect of schooling.

In this study I investigate whether and to what extent, if any, education is associated with Body Mass Index (BMI), a primary measure of obesity. Using sibling data from the Wisconsin Longitudinal Study (WLS), I attempt to estimate the schooling effect by controlling for family characteristics that have formed and nurtured early lives of individuals. This method is useful to eliminate family-level confounding factors that have been discussed in the recent literature as a potential determinant of adult health. See, for example, Case et al. (2002), Case et al. (2005), Fuchs (2004), and Cutler and Glaeser (2005). This approach, however, can be potentially inconsistent if between-siblings variation is caused by individual level heterogeneity. By including an extensive set of individual characteristics measured through high school years, I attempt to alleviate part of this omitted variable bias.

The main findings are as follows. The sibling-based estimates indicate that one more year of schooling is associated with a reduction of 0.15 in BMI, conditioning on other individual characteristics. In a model with schooling level indicators, most of the schooling effect emerges at the margin of completing college or higher education levels. Having a BA or higher degree is associated with a 0.7

reduction in BMI. These estimates from sibling-comparison come out 77% to 86% smaller than the conventional least squares estimates. When stratified by sibling types, schooling effects are statistically significant across same-sex and opposite-sex sibling pair samples, but larger for the opposite-sex sibling pairs. For a sensitivity test of the estimates, the alternative approach, the random effect estimation with a proxy of family fixed effects, is also used. The estimates are robust across these two estimators. Similar findings are discovered for the probabilities of being overweight or obese. This study extends the literature by providing new evidence on the long-term effect of education on BMI based on the analysis of sibling pairs. The present study shows that, despite substantial effect of family background, there exists large variation of BMI in middle age between siblings and that educational attainment explains part of this BMI variation. College education effects that remain significant in later stages of life offer some support to the notion that policy intervention through educational program in adulthood can be useful in addressing health inequalities that may have arisen from childhood across families with different backgrounds.

The remainder of the paper is organized as follows. Section 2 describes the data and Section 3 presents an empirical framework. The empirical findings are discussed in Sections 4 and 5. The estimation of the schooling effects on the probability of being obese and overweight is also conducted in Section 5. Section 6 provides discussion on the possible mechanisms of schooling effects and Section 7 concludes.

## 2. Data

The data used in this study come from the Wisconsin Longitudinal Study (WLS). The WLS is a longitudinal survey of 10,317 randomly selected men and women who graduated from Wisconsin high schools in 1957. Most of the respondents are white with very few from other ethnic groups.<sup>4</sup> The WLS has followed the respondents in 1975, 1992 and 2004 since the first survey in 1957. From 1977, the WLS also surveyed one randomly selected sibling for each primary respondent. In 1992 and 1993, health outcomes as well as other extensive information were collected from the primary respondents and their siblings. The sample extracted for this study consists of 5722 respondents and siblings from the 1992 and 1993 surveys when most of the people in the sample had reached their early fifties. For more information on the WLS, see Herd et al. (2014).

As the primary respondents were restricted to high school graduates in Wisconsin, although their siblings were not, one may raise concerns about sample selection. Wisconsin has provided a favorable environment for human capital investment since the rise of public secondary schooling in 1910s. For example, it was one of the few states that set the minimum school leaving age

<sup>4</sup> There are 4 families with fathers from Asia and the rest of the families have fathers who are originally from Europe.

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