



Gender differences in the impact of weight status on academic performance: Evidence from adolescents in Taiwan[☆]



Yu-Lung Lu^c, Stephen Jui-Hsien Chou^c, Eric S. Lin^{a,b,*}

^a Center for Learning Assessment Service and Department of Economics, National Tsing Hua University, Hsin-Chu 30013, Taiwan

^b Public Economics Research Center, National Taiwan University, Taipei 10617, Taiwan

^c Department of Economics, National Tsing Hua University, Hsin-Chu 30013, Taiwan

ARTICLE INFO

Article history:

Received 3 September 2013

Received in revised form 3 August 2014

Accepted 4 August 2014

Available online 23 August 2014

JEL classification:

I19

I21

J16

Keywords:

Academic performance

Overweight

Underweight

Body mass index (BMI)

Propensity score matching

ABSTRACT

This paper takes advantage of the Taiwan Education Panel Survey data set to empirically evaluate whether a student's academic performance, measured by his or her test score, is affected by the body weight status of the student. We show that a student's weight status has no impact on his or her academic performance based on an OLS estimation; however, this result is likely to be incorrect due to the strong distributional and functional assumptions, and we further use the propensity score matching method to address this issue. If the entire sample is considered, we find that both overweight and underweight students perform worse than students of normal weight. If we separate the sample students into two groups according to their gender, we obtain different results for the different groups. While the male students tend to perform worse when they are either underweight or overweight, the adverse effect on the academic performance is larger for underweight students than for overweight students. By contrast, the academic performance of a female student will be affected only if she is overweight, but not if she is underweight. The policy implication that the government or the schools should have different plans for different gender groups can be drawn from our empirical finding.

© 2014 Elsevier Ltd. All rights reserved.

1. Introduction

The dramatic rise in the number of overweight children in recent years has sparked a number of studies that examine the consequences of overweight individuals at young ages on their health and socio-economic status in adulthood (Dietz, 1998a,b; Gortmaker, Must, Perrin, Sobol, & Dietz, 1993; Must, Jacques, Dallal, Bajema, & Dietz, 1992). In particular, the psychological effects of being overweight such as lower self-esteem and depression have been extensively investigated (Davison & Birch, 2001; Erickson, Robinson, Haydel, & Killen, 2000; French, Story, & Perry, 1995; Strauss, 2000; Strauss & Pollack, 2003). Numerous studies empirically explore the association between weight (mostly in terms of body weight or body mass index, BMI) and the educational achievement of children. Most of them focus on the

overweight issue and yield mixed results. By looking at different ages, Crosnoe and Muller (2004), Datar, Sturm, and Magnabosco (2004), and Averett and Stifel (2007, 2010) each concluded that obesity negatively affects students' test scores.¹

Although the effects of being overweight on students' scores are negative in general, these effects are indeed different between students of different genders. Datar and Sturm (2006) and Ding, Lehrer, Rosenquist, and Audrain-McGovern (2009) both reported negative effects of obesity on grades among girls. Sabia (2007) in particular pointed out that there is a significantly negative relationship between adolescent white girls' BMIs and their academic performance. By contrast, Eide, Showalter, and Goldhaber (2010) concluded that being overweight is, if anything, positively associated with math and reading test scores for boys.

Some studies suggest that there might be no causal relationship between obesity and academic performance. Kaestner and Grossman (2009) found that being overweight or obese has little impact on children's scores on standardized tests in math and reading. Zavodny (2013) showed that children who are overweight are generally no

[☆] We would like to thank two anonymous referees, Hwei-Lin Chuang, Mei Hsu, Roger P.C. Cheng and Shih-Yung Chiu for their many useful comments and suggestions on earlier drafts of this paper. Special thanks are extended to Academia Sinica, the Ministry of Education, the National Academy of Educational Research, and the National Science Council in Taiwan for kindly providing the Taiwan Education Panel Survey data. Financial support from the National Science Council in the form of grant NSC 100-2410-H-007-025-MY2 is gratefully acknowledged. The responsibility for errors in fact or judgment is ours.

* Corresponding author. Tel.: +886 3 574 2729; fax: +886 3 562 9805.
E-mail address: slin@mx.nthu.edu.tw (E.S. Lin).

¹ Crosnoe and Muller (2004) used the National Longitudinal Study of Adolescent Health database for children in grades 7 to 12. Datar et al. (2004) used the Early Childhood Longitudinal Study-Kindergarten Class (ECLS-K). Averett and Stifel (2007, 2010) used the National Longitudinal Survey of Youth data set for children aged 6–13.

different in terms of standardized test scores in reading, math, and science.

Despite the prevalent and well-documented concerns about the rising obesity epidemic for children and adolescents, the issue of how being underweight affects a student's academic performance has received far less attention in the literature.² In 2007 and 2008, the percentage of underweight U.S. children aged 6–11 years was about 3.0%, while the percentage of underweight adolescents aged 12–19 years reached 4.2% (Fryar & Ogden, 2010). Wendt and Kinsey (2009) found that underweight students in elementary school have lower standardized math test scores than their healthy counterparts. By looking at children in kindergarten, Karp, Martin, Sewell, Manni, and Heller (2003) came to a similar conclusion. Eide et al. (2010) concluded that being underweight is negatively associated with boys' math test scores. By contrast, Zavodny (2013) found that being underweight is not significantly related to standardized test scores in reading, math, and science.

Taiwan's rapid economic growth during the latter half of the 20th century transformed it into a newly-industrialized developed country, resulting in its becoming one of the Four Asian Tigers (namely, Taiwan, South Korea, Hong Kong and Singapore). This economic rise is referred to as the "Taiwan Miracle". In particular, during the 1960s and 1970s, real GDP grew by about 10% (7% per capita) each year. It was later classified as an advanced economy by the IMF and as a high-income economy by the World Bank. Meanwhile, Western-style food (particularly the fast food served by the U.S. or European franchised restaurants such as McDonald's, KFC, Pizza Hut and many more) was introduced to Taiwan, which greatly impacted the eating habits of Taiwanese people. In addition, a busy lifestyle over the last few decades has left people with little time to cook and they have tended to eat outside, leading to excess calorie intake and increasing the risk of obesity for children in Taiwan because of the large portion sizes and increased energy density of foods.

Adolescence emphasizes the body image concern that is associated with sociocultural expectations of an ideal female body shape, for example that thinness is beautiful in women (Brodie, Bagley, & Slade, 1994; Folk, Pedersen, & Cullari, 1999). This concept is now commonly found among young females in high income East Asian societies such as Japan, Singapore, Hong Kong, and South Korea (Lee, Kwok, Liao, & Leung, 2002; Nishizawa et al., 2003; Tsai, 2000; Ung, 2003). Due to the geographical and cultural proximity, it is easy for Taiwanese society to be affected by neighboring countries such as Japan and Korea. The trend through the mass media (newspapers, magazines, advertisements, TV shows, etc.) has also influenced Taiwanese society so that women, particularly in adolescence, want to be thin in order to be considered beautiful by themselves or their peers. Hence, not surprisingly, adolescent women in Taiwan tend to lose weight and achieve a slim physique (Chen, Fox, & Haase, 2008; Tsai, Chang, Lien, & Wong, 2011). Therefore, body shape dissatisfaction is prevalent among all Taiwanese adolescents (especially in junior high schools). How to lose weight remains a hot issue for young girls in school and in daily life. This phenomenon brings to light the fact that many Taiwanese adolescents, particularly females, are in the underweight status.

This paper attempts to study the relationship between body weight and academic performance with several new features. First, the propensity score matching method is utilized to estimate the causal effect of weight on students' educational achievement by assuming selection on observables.³ Our empirical methodology offers three distinct advantages. 1) We effectively examine the impact of weight status in the 7th grade on the 9th grade test score controlling for the 7th grade test score and thereby minimize the possibility of reverse

causality.⁴ 2) Focusing on the 9th grade test score conditional on the 7th grade test score is similar to the changes approach (changes in test scores), which allows time-invariant determinants of academic performance such as self-discipline that may be correlated with weight status to be differenced out.⁵ 3) Unlike the least squares approach that imposed strong distributional and linear functional form assumptions, the propensity score matching balances the covariates for the groups being compared and does not rely on parametric assumptions – leading to a more robust result.

Secondly, we simultaneously consider the impact of being "overweight" and "underweight" on students' academic performance, along with the differentiated effect of weight status by gender. As was just mentioned, previous studies in this field largely focus on the case of being "overweight", while only a few consider the case of being "underweight". We emphasize that, in addition to the U.S., more countries (including advanced and newly-industrialized countries) have also become aware of the problem of being underweight in recent years, e.g., a series of independent cross-sectional sample surveys that were conducted in 2002, 2004 and 2006 in Tuscany, Italy reveal that the trend in the prevalence of being overweight (including obesity) among girls from 9 to 15 years old strongly decreased, while the prevalence of thinness increased (Lazzeri et al., 2008).

Finally, this paper focuses on junior high school students instead of kindergarten or elementary school ones because junior high students tend to care more about their appearance so that the psychological effects of abnormal weight on learning outcomes are more likely to be stronger. It is thus more appropriate to concentrate on junior high school students to evaluate the link between weight and academic performance.

Our empirical application takes advantage of the Taiwan Education Panel Survey starting with the year 2001, which keeps track of the students' personal information (including weight, height, test scores and so on), family socio-economic status, school information and teachers' information every two years. We then quantitatively examine the effect of weight status (in terms of BMI) on junior high school students' academic performance, in considering both the "overweight" and "underweight" effects. The remainder of this paper is organized as follows. In the next section, we discuss the theoretical arguments underpinning the links between weight and educational performance. Section 3 describes the data and reviews the estimation strategy. Section 4 illustrates the empirical results. School policy prescriptions are proposed in Section 5. The final section concludes this paper.

2. Theoretical arguments

In this section, we first review several channels concerning how being overweight or underweight affects a student's learning outcomes. We then introduce the reverse case where a student's poor academic

⁴ It is also intuitive that being underweight or overweight might adversely affect a student's health condition and eventually worsen the student's academic performance. It is also possible that students with poor performance in school may become overweight or underweight because they consume more food to psychologically compensate for their poor performance or eat too little due to suppressing their appetite (Sabia, 2007). Therefore, it is crucial to handle this mutual causality problem. Previous studies either ignored this issue or resorted to the so-called instrumental variable (IV) approach, e.g., Sabia (2007) and Kaestner and Grossman (2009); however, finding a good instrumental variable is in practice difficult and is usually regarded as an "art". Moreover, even if there are instruments available, such variables are likely to suffer from the "weak instrument" problem. For the caveats about the instrumental variable approach, please refer to Angrist and Pischke (2008).

⁵ Todd and Wolpin (2003) point out that the "value-added specification" relates an achievement outcome measure to contemporaneous school and family input measures and a lagged or a baseline achievement measure (i.e., the 7th grade test score in our context). They also mention that "a more restrictive specification sometimes adopted in the literature sets the parameter on the lagged achievement test score to one", which corresponds to the "changes approach". Kaestner and Grossman (2009) employ the changes approach to study the association between weight and children's educational achievement. Moreover, Datar and Sturm (2006) also perform a multivariate regression by running third grade outcome (dependent variable) conditional on the baseline learning outcome and other covariates and argue that this is akin to a changes approach.

² Note that we do not aim to consider the children poverty and malnutrition problems in the developing and least developed countries such as those in Africa.

³ Several studies apply the propensity score matching technique to assess the causal effect of BMI on labor market outcomes (García & Quintana-Domeque, 2007; Sousa, 2005).

Download English Version:

<https://daneshyari.com/en/article/6834205>

Download Persian Version:

<https://daneshyari.com/article/6834205>

[Daneshyari.com](https://daneshyari.com)