

The Social Cost of Childhood Overweight and Obesity – Results on Health Care Usage, Well-Being, Education, and Labor Market Outcomes Until the age of 21

Key Findings



Key Findings

Introduction

In most Western countries, overweight among children, adolescents, and adults has increased significantly in recent decades and is considered a major societal challenge. Despite a broad consensus in the current relevant literature that overweight and obesity increase social costs, i.e., has a negative impact on well-being, schooling, health care, and employment, estimates vary substantially among studies due to different study populations, differences in measurements of overweight and social cost, and different estimation methods. Furthermore, most studies estimate the impact of overweight or obesity in adulthood on outcomes later in life. These estimates, however, do not necessarily mirror the relevant behavior and choices that occurred earlier in life – behavior and choices that are crucial for future health and labor market opportunities.

Aim

In this report, we investigate the consequences of being overweight and obese in elementary school (average age 7) and lower secondary school (average age 14). We exploit a unique data set using population-based measurements of height and weight, and investigate the consequences on a long list of outcomes related to well-being, health care usage, education, and the labor market.

Definition

The measure of overweight and obesity is based on the body mass index (BMI). BMI is weight in kilograms divided by height in meters squared. In this report we use the school nurses' measurements of height and weight, calculate BMI, and classify weight status according to The International Obesity Task Force classification scheme, which takes into account the child's age at the time of measurement, and gender.

Results

Overall, we find that being overweight and obese during childhood adversely affects well-being and school absence as well as school performance measured in elementary and lower secondary school. We further find that having excess weight in lower secondary school affects enrollment patterns in upper secondary education. In particular, children with overweight and obesity are less likely to enroll in high school. Instead, they are more likely to enroll in vocational education and more likely to not enroll

in any upper secondary education by the age of 18. Furthermore, overweight and obese children have a higher probability of receiving social income transfers at age 21.

Data and methods

The results in this report are based on Danish population data on 340,425 lower secondary school children and 317,246 elementary school children with height and weight data obtained from health visits at the school from 2011 through 2017. Sample attrition analyses indicate that both the elementary school and lower secondary school sample is positively selected (e.g., includes children with fewer diagnoses of a mental or behavioral disorder and children from higher socioeconomic backgrounds compared to the general population). Still, we expect the selection to be of minor importance for the estimated average effects.

We compare children who are overweight or obese to children who are of normal weight, and investigate multiple outcomes of education, mental health, health usage, and social assistance across gender and socioeconomic background. Besides calculating the raw differences in the outcomes, we apply two different econometric methods. First, we estimate an ordinary least square (OLS) model, where we include a long list on control variables (all measured before outcome) including information pertaining to early health of the child, e.g., birth weight, as well as rich background information on the parents, e.g., education and income. Second, to investigate the role of unobserved characteristics related to family background we estimate a sibling fixed-effects model. While the results from these two models inform us about the robustness of the results, both methods have limitations, and we cannot rule out that unobserved characteristics related to overweight and obesity might bias the results.

In general, health care cost is low for children, both in elementary school and lower secondary school, and there is little difference in the health care cost between normal-weight children, and overweight and obese children. Almost all of the health care costs are related to hospital admission.

To summarize, the results in this report point to negative consequences for both overweight and obese children. However, compared to children of normal weight, the effects sizes for children with obesity are higher than for children with overweight in most cases. The distinction between overweight and obese children is important because children who are overweight are more likely to be of normal weight later, e.g., due to an increase in height. Children with obesity do not have the same likelihood of being of normal weight later and their weight trajectory is often established at an early age.

Though much of the reviewed literature finds that girls appear to be more affected than boys on several outcomes, we find little evidence of systematic gender differences. An exception is that boys seem to be less likely to sit the exams if they are obese compared to normal weight, which does not seem to be the case for girls. Girls seem to be more likely to use health care when obese com-

pared to of normal weight, which does not seem to be the case for boys.

Finally, overweight and obese children with disadvantaged backgrounds are not systematically more negatively affected than those coming from advantaged backgrounds. This result is in contrast to some other studies pointing at

various negative consequences of childhood health problems for disadvantaged children.

We use two empirical models to estimate the results; ordinary least square models with a long list of controls, and sibling fixed-effects models, which take unobserved characteristics in the family into account. In most cases, the parameter estimates become smaller and statistically insignificant when using the fixed effects model, indicating that family characteristics, such as norms, lifestyle, and economic and social resources related to the children's body weight are also related to their outcomes. This is particularly the case in the models on school outcomes in elementary school and health care usage (in general and related to mental health) and social income transfers at ages 18 and 21. The estimated impact of overweight and obesity on school outcomes at age 18 and well-being measures, such as bullying and loneliness, in elementary school all show adverse and significant results, irrespective of the choice of model.

Conclusion

Overall, we find that being overweight and obese during childhood adversely affects social well-being, school performance, and school choices. In particular, we find that being overweight and obese negatively affects the grades in the final 9th grade exam and increases the probability of not being enrolled in an upper secondary education by age 18. While these outcomes are relevant in themselves, they are also expected to have an impact on long-term social costs, such as completed education, employment, income, and health.

Most previous literature points to significant health care costs of overweight and obesity. While we find significant effects on health care usage, the total health care costs are relatively small at ages 10 and 18. However, as most diseases related to overweight and obesity occur in adulthood, these costs might have been larger if we were able to estimate the cost at older ages. Previous literature has pointed to a significant increase in health care usage of overweight and obese people. Thus, it is relevant to re-estimate these effects at older ages, when these data become available.

While our results on mental health care usage are less clear in terms of adverse effects, we find strong evidence of negative effects on well-being of being overweight and, in particular, of being obese. Further research into initiatives that can improve well-being and school performance among children with overweight or obesity already in elementary school is warranted, as such initiatives may send them onto a better life track. Our results point to interventions that help maintain a high level of well-being and decrease school absence, as these are likely to have a positive impact on the children's school results and choices.

Box 1 Highlights of the results

Below we summarize the main consequences of childhood overweight and obesity. We estimate both an OLS model and a sibling fixed effects model, which we believe provides an upper and lower bound of the estimates of the consequences of overweight and obesity. Relative to normal-weight children:

- Children with overweight or obesity are 18-28% and 27-55%, respectively, more likely to be bullied in 4th grade. Among normal-weight children, 12% experience bullying in 4th grade.
- Children with overweight or obesity, when attending the exam, received a 0.1-0.2 and 0.2-0.5 standard deviation lower GPA in the grade 9th exit exam.
- Children with overweight or obesity have 4-15% and 19-42%, respectively, more school absence during 9th grade. Normal-weight children have an absence rate of 6%, equivalent to 12 days, during 9th grade on average.
- The probability of not being enrolled in an upper secondary education, i.e., neither high school nor vocational education, by age 18 is between 18-34% and 44-117% higher for children with overweight or obesity, respectively. Among normal-weight children, 6% are not enrolled in an upper secondary education by age 18.
- Overweight or obese children are 21-38% and 54-85%, respectively, more likely to receive social income transfers at age 21. Among normal-weight children, 10% receive a social income transfer at age 21.

Box 2 Overview of the monetary costs of childhood overweight and obesity at ages 10, 18, and 21

Below we summarize the estimated monetary costs from health care usage at age 10 and age 18 and social income transfers at age 21. Overall, the cost of overweight or obesity on these outcomes, measured in childhood and adolescence, are small. However, as diseases related to excess body weight are likely to occur later, in adulthood, and the probability of receiving social income transfers already in early adulthood is significantly larger for overweight and obese children compared to normal-weight children, we might expect larger monetary costs in the future. The per-child cost is largest for obesity.

The aggregated monetary costs for an average cohort related to: *(all results are relative to normal-weight children)*

- Primary health care sector at age 10 are DKK 371,000-528,000 for overweight and DKK 201,000-257,000 for obese children.
- Secondary health care sector at age 10 are DKK 1.7-2.5 million for overweight and DKK 2-2.3 million for obese children.
- Primary sector figures at age 18 are not significantly different.
- Secondary health care sector figures at age 18 are DKK 98,000-2,096,000 for overweight and DKK 802,000 – 828,000 for obese children. The lower-bound estimates are not significantly different from 0.
- Social income transfers at age 21 are DKK 14-21 million for overweight and DKK 8-14 million for obese individuals. The lower-bound estimates are not significantly different from 0.

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