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Evaluating the impact of a school-based health intervention using a randomized field experiment



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ABSTRACT

We conduct an econometric evaluation of a health-promoting programme in primary and lower secondary schools in Denmark. The programme includes health-related measurements of the students, communication of knowledge about health, and support of health-promoting projects for students. Half of the schools in the fourth largest municipality in Denmark were randomly selected into a treatment group implementing the programme, while the remainder served as a control group. We estimate both OLS models using only post-intervention observations and difference in differences (DID) models using also pre-intervention observations. We estimate effects of the initiative on BMI, waist/height ratio, overweight and obesity for the entire sample and by gender and grade. We find no consistent effect of the programme. When we use the entire sample, no estimates are statistically significant at conventional levels, although the point estimates for the effect on BMI, indicating an average reduction in the range of 0.10–0.15 kg/m², are consistent with the results in a recent Cochrane review evaluating 55 studies of diet and exercise interventions targeting children; and DID estimates which are marginally significant (at the 10% level) indicate that the intervention reduces the risk of obesity by 1% point. Running separate estimations by gender and grade we find a few statistically significant estimates: OLS estimates indicate that the intervention reduces BMI in females in grade 5 by 0.39 kg/m² and reduces the risk of obesity in females in grade 9 by 2.6% points; DID estimates indicate an increase in waist for females in preschool class by 1.2 cm and an increase in the risk of obesity in grade 9 males by 4% points. However, if we corrected for multiple hypotheses testing these estimates would be insignificant. There is no statistically significant correlation between participation in the programme and the number of other health-promoting projects at the schools.

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1. Introduction

Over the past decades, problems with overweight in children have increased in almost all Western countries (Komlos et al., 2009; Rokholm et al., 2010). In Denmark the prevalence of child overweight and obesity increased

significantly from 1975 to 2007, reaching a prevalence of overweight of 12–16% among boys and girls aged 5–8 and 19–25% among boys and girls aged 14–16 (Pearson et al., 2004, 2010). In many Western countries, including Denmark, the trends in children's physical activities and dietary patterns seem to have changed simultaneously with the trend in child overweight. While there has been an increase in the percentage of overweight children, Rasmussen and Due (2011) find that the percentage of children doing vigorous exercise and eating fruits and

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vegetables daily has decreased, and the average number of hours spent on sedentary activities, such as watching television and playing computer games, has increased.

Being overweight or obese during childhood and adulthood is an important risk factor for the development of several chronic diseases such as coronary heart diseases, type 2 diabetes, hypertension and various cancers, and overweight in adolescence is associated with increased mortality later in life (Must et al., 1992). Furthermore, overweight during childhood and adolescence is linked to various psychological problems such as depression and low self-esteem (Daniels, 2006; Forste and Moore, 2012). Overweight children are at increased risk of becoming overweight or obese as adults, especially if they are overweight during adolescence (Whitaker et al., 1997), and once obesity has been established during adulthood, the probability of losing weight is low. Thus, the strain that these consequences of childhood overweight will place on the individual and on the health care system in the future highlights the need to develop instruments that can guide children to a healthy lifestyle that prevents overweight.

There exists a large literature on health interventions to reduce the prevalence of overweight and obesity, including very general interventions such as increasing taxes on unhealthy food and beverages (e.g., Lin et al., 2011) and interventions targeting children (and their families) aimed at improving diet and exercise behaviour through health education, free fruit and vegetables schemes and physical activity programmes (e.g., Moodie et al., 2008; te Velde et al., 2011). In a recent Cochrane review, Waters et al. (2011) analysed 55 studies that evaluate diet and exercise interventions to prevent overweight in children. Most of these studies targeted children aged 6–12, and most interventions took place within the school. The effect of the interventions depended on the setting, the intensity and the type of intervention, and on the age group targeted. Overall, Waters et al. (2011) find beneficial effects on BMI, especially among younger children (aged 6–12).

This paper examines the impact of a school-based health programme called the Healthy Schools Network (HSN, in Danish “Sund Skole Nettet”). The overall aims of the programme are to communicate knowledge about health and to support health-promoting projects, e.g. more physical education and guidance in healthy dieting, for students in primary and lower secondary schools, i.e. children aged 5–16. The programme includes establishing a school health committee at each school and measurement of a range of parameters that indicate students’ state of health. These parameters include height, weight, waist circumference, fitness rating and vertical jump height. The intention is that health-promoting actions initiated by the local health committees and the health measurements will make the children (and their parents and teachers) more aware of their health status and thereby induce behavioural change towards increased physical activity and improvement in diet. Teachers are encouraged to use results based on average data by age group (available at the programme’s website) in their teaching, and ideas for various health-promoting activities are communicated to schools through the network. The programme has been

implemented at about 200 schools in Denmark in recent years.

To investigate the impact of the HSN programme on children’s health status (measured by BMI and waist circumference), we use a randomized field experiment in 33 primary/lower secondary state schools in the fourth largest municipality in Denmark. Sixteen schools, with a total of approximately 8000 pupils aged 5–17, were randomly assigned to participate in the HSN programme, and 17 schools, with a total of approximately 9000 pupils, were selected as controls and offered the opportunity to participate in the programme 2 years later on the same conditions as the schools that were assigned to start immediately. To evaluate the programme we used measurements of height, weight and waist circumference of children in four different grades (preschool, 1st, 5th and 9th) made by health visitors (school nurses) at all schools. These measurements are available for 3 school years (2009/10, 2010/11 and 2011/12), i.e. both before and after programme start, allowing us to apply difference-in-differences (DID) methods. Using different econometric specifications, we estimate models for all four grades and both genders combined, as well as separate models by grade and gender. We find no consistent effect of the programme. Most point estimates indicate negative effects on BMI, overweight and obesity, but positive effects on waist/height ratio. However, these estimated effects are rather small, and only a few are statistically significant.

2. The HSN programme

2.1. The institutional context

In 2008 the Rockwool Foundation initiated the HSN programme as an offer to all state schools (primary and lower secondary) in Denmark. The project was motivated by a general increase in child overweight in Denmark, and the elements in the initiative were inspired by a pilot project involving upper secondary school students (Greve and Andersen, 2012). In general, participation in the project was voluntary for individual schools, but in the municipality of Odense a randomized controlled experiment was designed to evaluate the project. In the school years 2008/09 and 2009/10, participating schools received subsidies of DKK 80 (approx USD 15 or EUR 10) per student if the school did the following: (1) formed a health committee and selected a teacher to be responsible for health at the school; (2) made measurements of at least 80% of the students with respect to height, weight, waist circumference, fitness rating (cardiorespiratory fitness) and vertical jump height, and uploaded the results to a central database; and (3) delivered a yearly report describing the health status and ongoing health activities at the school. The amount of money the schools received per student was reduced by half in 2010/11.

2.2. Description of the programme and its intended effects

The main focus in the HSN programme is to communicate information about the health status of the children involved (based on the health measurements) via the

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