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Peer effects in adolescent overweight☆

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ABSTRACT

This study is the first to estimate peer effects for adolescent weight. We use data from the National Longitudinal Study of Adolescent Health (Add Health) and define peer groups using nominated friends within schools. Endogenous peer groups are accounted for using a combination of school fixed effects, instrumental variables, and alternative definitions of peers (i.e., grade-level peers). Mean peer weight is correlated with adolescent weight, even after controlling endogenous peer groups. The impact of peer weight is larger among females and adolescents with high body mass index. The results are consistent with social multipliers for adolescent overweight policies.

1. Introduction

The prevalence of overweight in children, the term used to define childhood obesity, has increased dramatically over the last 40 years. The prevalence of overweight among children and adolescents was four times higher in 2002 than in the 1960s (16% vs. 4%) (Hedley et al., 2004). As a result, interest in identifying the causes of this trend and policies for reducing childhood overweight is growing.

Research on the determinants of childhood overweight has focused on parental influences, the role of food prices, the built environment, and school nutrition policies (Koplan et al., 2005). One area that has not received much attention to date is the role of peers in determining adolescent weight. The existing literature on peer effects suggests that peers influence other health behaviors among youth, including smoking, alcohol and drug use (Evans et al., 1992; Norton et al., 1998; Gaviria and Raphael, 2001; Powell et al., 2005; Lundborg, 2006; Clark and Loheac, 2007). Regarding attitudes and weight-related behaviors, the psychology and medical literature has shown that social influences impact norms for perceived obesity and that peer involvement in weight loss programs is effective (Paxton et al., 1999; Wing and Jeffery, 1999; Jelalian and Mehlenbeck, 2002; Eisenberg et al., 2005). In addition, new evidence among adults suggests that obesity spreads through social ties (Christakis and Fowler, 2007). However, there is no literature on the impact of peer effects on adolescent weight.[1]

This study seeks to estimate peer effects for adolescent weight. There are several reasons to believe that one's peers can affect weight. Peers can influence a variety of weight-related choices including healthy and unhealthy eating patterns (e.g.,

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[1] Strauss and Pollack (2003), using the same data as this study, investigate the influence of adolescent weight on adolescent social networks, but not the impact of the network's weight on the adolescent. Our focus is the latter effect.

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cafeteria vs. snack shop), dieting, and physical activity (e.g., extra-curricular sports). Peers can also affect perceptions of acceptable weight (e.g., Crawford and Campbell, 1999).

Burke and Heiland (2007) develop a theoretical model of optimal weight that incorporates this kind of social dynamic. They extend the models of optimal weight by Lakdawalla and Philipson (2002) and Cutler et al. (2003) by making ideal weight in the utility function an endogenous function of the average weight of the social reference group. In their model, the target weight is a fraction of average weight in the peer group; people desire to be thinner than average. As their peers gain weight, they can gain weight and achieve a higher level of utility. This model provides a theoretical link explaining how the weight of one's peers can indirectly *cause* weight gain at the individual level.

If peers do have an influence in determining adolescent weight, then policies aimed at reducing adolescent overweight could have social multiplier effects where the impact of the policy in the aggregate is larger than for individual participants (Glaeser et al., 2002; Christakis and Fowler, 2007).

We use data from the National Longitudinal Study of Adolescent Health (Add Health) to estimate the influence of peer weight on adolescent's own weight. Add Health allows us to define peer groups using nominated friendship relationships. Few other studies have been able to define peer groups at such a fine level (one exception is Clark and Loheac, 2007, who also use Add Health to examine peer effects for smoking, alcohol and marijuana). While friends might be more influential than other common definitions of peer groups such as all students in a school,[2] friends' weight is likely to be endogenous. We address this using three strategies. First, we look at variation in peer-group weight within schools. Second, we use information on friends' parents' obesity and health and friends' birth weight to instrument for peers' weight. The identifying assumption is that friends' birth weight and friends' parental obesity and health only affects an adolescent's weight through its effect on friends' weight. Third, we alternatively define peer groups using all students in the same grade. After controlling for school fixed effects, peers defined at the grade level are plausibly exogenous (Clark and Loheac, 2007).

Our results suggest that peer effects exist for adolescent weight. The impact of peer weight is larger among females and adolescents with high body mass index (kg/m^2; BMI). The results do not rule out social multipliers for childhood and adolescent overweight policies.

The paper is organized as follows. Section 2 discusses the estimation of peer effects and our identification strategy. Section 3 describes the data and our specification. Section 4 presents the main results and sensitivity analysis. Section 5 concludes.

2. Estimating peer effects

Using Manski's (1993) framework, peers' weight could be correlated with an adolescent's weight in observational data because (1) peers' weight influences adolescent weight directly (endogenous or causal effects), (2) peers' characteristics other than weight influence adolescent weight (exogenous or contextual effects), or (3) a common set of unobserved characteristics influence both own and peer weight (correlated effects). The goal of this analysis is to identify the causal effects of peers' weight on adolescent weight through the types of mechanisms described above (e.g., peers' weight determining target weight).

Contextual effects are present if peers' characteristics such as income or race/ethnicity influence adolescent weight. We follow the existing literature and assume that there are no contextual effects (Norton et al., 1998; Gaviria and Raphael, 2001; Powell et al., 2005). The assumption is that any influence peers might have on adolescent weight is through their own weight.[3]

There are three primary sources of correlated effects for friendship peer groups. First, any school policy that affects diet or exercise and is shared by all students will lead to correlated effects. Second, families might endogenously sort into areas and schools based on unobserved factors leading students within schools to look similar. It seems unlikely that selection of school district would be based on adolescent weight, but it could be based on amenities plausibly correlated with adolescent weight such as the availability of recreation areas and grocery stores. Third, even within schools, friends are likely to share common activities (e.g., sports) that are unobserved to an econometrician. Accounting for these effects is important because if correlation between adolescent weight and peers' weight is due to contextual or correlated effects, policies that reduce adolescent overweight would not lead to social multipliers.

We use three strategies to control for correlated effects and identify causal effects of peers' weight on adolescent weight. First, we include school fixed effects in all of our specifications. Looking within schools to identify peer effects eliminates the influence of any unobserved school or neighborhood amenities that might lead to sorting of families into schools (Arcidiacono and Nicholson, 2005). We also control directly for whether parents report the school system as being important in the decision to live in their neighborhood. School fixed effects also control for any shared influences at the school level such as school lunch policies or physical education requirements (Clark and Loheac, 2007).

Second, we instrument friends' weight using information about friends' birth weight, friends' parents' obesity, and friends' parents' self-reported health status. Peer-group characteristics have been used previously as instruments for peer behavior among youth (Gaviria and Raphael, 2001; Powell et al., 2005). Under the assumption that background characteristics of peers

[2] Bearman and Brückner (1999) summarize findings from Add Health for sexual behavior and find that peers at the school as a whole had little impact on female sexual behavior.

[3] See Section 4 for supporting evidence of this assumption.