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The Effect of Adolescent Health on Educational Outcomes: Causal Evidence using 'Genetic Lotteries' between Siblings

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The Effects of Adolescent Health on Educational Outcomes: Causal Evidence using 'Genetic Lotteries' between Siblings[•♦]

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Abstract

There has been growing interest in using specific genetic markers as instrumental variables in attempts to assess causal relationships between health status and socioeconomic outcomes, including human capital accumulation. In this paper we use a combination of family fixed effects and genetic marker instruments to show strong evidence that inattentive symptoms of ADHD in childhood and depressive symptoms as an adolescent are linked with years of completed schooling. Our estimates suggest that controlling for family fixed effects is important but these strategies cannot fully account for the endogeneity of poor mental heath. Finally, our results demonstrate that the presence of comorbid conditions present immense challenges for empirical studies that aim to estimate the impact of specific health conditions.

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Executive Summary:

Recent national statistics indicate that poor health outcomes are becoming increasingly prevalent among Canadian youth. For instance, *The Progress of Canada's Children and Youth 2006* reports that over the last 25 years, the proportion of young people who are overweight or obese has jumped from 15% to 26%. Similarly it has been estimated that between 10 to 20 per cent of all Canadian youths now suffer from a mental, emotional or behavioural disorder. As such, understanding whether these poor health outcomes impact the development of skills and human capital is becoming increasingly important. Yet the majority of empirical research examining whether there are links between poor health in childhood and adolescence to future education and labour market outcomes is unable to establish a causal pathway. The difficulties in establishing causal links either involve data limitations or issues related to econometric identification.

In this study we overcome these hurdles using a unique dataset that contains information on mental health, obesity, academic outcomes and specific portions of an individual's genetic code for full biological siblings including dizygotic twins. Numerous studies have reported that within families, siblings and twins are often radically different in personality traits, health, education and labour market outcomes. Researchers have traditionally examined whether different environmental factors account for the development of these differences within families and have concluded that these factors can only account for a limited amount of the variation in outcomes within families. With the decoding of the human genome, recent years have been characterized by substantial amounts of research in several scientific fields examining whether specific variants in genetic code (aka single nucleotide polymorphisms (SNPs)) between dizygotic twins (among other family-based samples) are associated with specific diseases and outcomes. As clinical researchers identify unique genetic bases for many complex health behaviours, diseases and other outcomes, opportunities arise for social scientists to exploit this knowledge and use differences in specific sets of genetic information to gain new insights into a variety of questions.

In this paper, data we exploit differences in genetic inheritance among children within the same family to estimate the impact of several poor health conditions on academic outcomes via a family fixed effects instrumental variables strategy. Intuitively, each time a new sibling is conceived, a "genetic lottery" occurs and roughly half of the genes from each parent are passed on to the child in a random process. These differences occur at conception and remain fixed between family members at every point in time irrespective of all nurture investments. Since a great deal of variation in characteristics and outcomes is found within families, exploiting the genetic processes that affect development (but are not self-selected by the individuals themselves) presents a potential strategy to identify the impact of poor health on academic outcomes within families. Since nearly every social, behavioural and health outcome has a unique

genetic basis, this identification strategy can potentially shed light on a large number of questions.

We present evidence that inattentive symptoms in early childhood have large lasting effects in reducing completed schooling. We also find little consistent evidence that adolescent overweight status influences years of schooling completed. Our estimates suggest that accounting for family fixed effects is important but these strategies cannot fully account for the endogeneity of poor mental heath. Finally, this strategy further confirms earlier work the effects of health on education by demonstrating that the presence of comorbid conditions present immense challenges for empirical studies that aim to estimate the impact of specific health conditions

One potential limitation of this study deals with external validity. It is important to consider whether our analysis of family members can be generalized to larger populations of interest. Yet it is likely that the benefits to the internal validity arising from integrating scientifically rigorous findings from the neurobiological and genetic studies into the methodologies employed in the social sciences are substantial and have the potential to not only improve our understanding in many research areas but also help develop policies that can promote human capital development.