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Does food insecurity at home affect non-cognitive performance at school? A longitudinal analysis of elementary student classroom behavior

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ABSTRACT

This paper estimates models of the transitional effects of food insecurity experiences on children's non-cognitive performance in school classrooms using a panel of 4710 elementary students enrolled in 1st, 3rd, and 5th grade (1999–2003). In addition to an extensive set of child and household-level characteristics, we use information on U.S. counties to control for potential confounding effects of the local economic and noneconomic environment on children's household transitions between states of food insecurity and food security. The time horizon of our analysis affords insight into factors underlying children's formation of non-cognitive skills and the efficiency of classroom-based educational production in elementary school. Overall, we find significant negative developmental effects for children with food insecurity at home; and that children experiencing an early transition from food insecurity in 1st grade to food security in 3rd grade have even larger impairments that persist through 5th grade.

1. Introduction

Ensuring that families with young children have the financial means to access available food resources is a continuous challenge to policymakers in both less-developed and developed countries. As recently as 2008, nearly seventeen million households in the U.S. (15% of the total) experienced such financial hardship that diets within the household were negatively impacted, and over sixteen million children currently reside in home environments that national guidelines characterize as having "insecure" access to nutritionally adequate food (Nord, Andrews, & Carlson, 2009).[1] It has been recognized that the experience of food insecurity and insufficiency encompasses a wide range of deleterious effects associated with hunger (Kleinman et al., 1998; Weinreb et al., 2002) and that hunger related stress is not uniformly distributed within a household or, in some cases, otherwise distinguishable from stress due to the circumstances of poverty alone (Bhattacharya, Currie, & Haider, 2004). Children represent

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[1] The prevalence and intensity of this particular kind of hardship is regularly monitored using a survey module developed by the U.S. Food Security Measurement Project, and the U.S. Census Bureau and U.S. Department of Agriculture (USDA) first collaborated to include a food security supplement in the Current Population Survey of April 1995. Consisting of a series of 18 questions for families with children, the module is designed to assess a household's ability to afford food during the previous year and the extent to which a lack of purchasing power forced an adjustment in the diets of household members. The USDA considers households as food insecure if three or more questions are answered affirmatively, and households are further classified by increasing intensity as "food insecure without hunger (3–7 affirmative responses)" or "food insecure with hunger (8–18 affirmative responses)." We estimate models allowing for a dose–response relationship using the specific USDA definitions, and the continuous food insecurity score, to investigate whether the impairments of children's non-cognitive skill development are related to the degree of intensity.

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a population whose growth and development is particularly vulnerable to nutritional stress, and the experience of food insecurity is linked with adverse physical and mental health and learning outcomes among children.[2]

Because the severity of food insecurity ranges from temporary interruptions in usual diet to chronic nutritional deprivation, attention has turned to exploring its role as an impediment to children's non-cognitive skill development. For instance, Murphy et al. (1998) and Jyoti, Frongillo, and Jones (2005) find that children from food insecure households have impaired non-cognitive skill development using composite measures that comprise several categories of skills. However, the evidence on interrelationships between household's food insecurity status and specific types of non-cognitive skills has been less clear. Kleinman et al. (1998) find positive associations between food insecurity and aggression, anxiety, and irritability, respectively; yet, Alaimo, Olson, and Frongillo (2001) find insignificant associations with shyness and the ability to make friends. It is important to continue to refine our understanding of how experiences with food insecurity affect children's development of non-cognitive skills because impairments can persist into adulthood (Dodge & Pettit, 2003; Masten et al., 2005) and undermine the effectiveness of classroom-based learning (Alexander, Entwisle, & Dauber, 1993).

In this study we investigate how the severity of food insecurity at home, and the particular pattern of temporal occurrence, impacts children's development during elementary school using longitudinal classroom-based measures of non-cognitive skills.[3] The importance of analyzing the determinants of this particular set of skills is underscored by recent evidence indicating the large role they have in shaping subsequent individual development and economic prosperity. Heckman, Stixrud, and Urzua (2006), for example, find a positive effect of non-cognitive skills on long-run human capital accumulation. Quantifying the degree to which food insecurity experiences impede young children's formation of non-cognitive skills can therefore help explain observed differences in socioeconomic outcomes among individuals and communities.[4] Moreover, if students from food insecure homes perform worse in the classroom then the cumulative developmental costs associated with children experiencing this condition may even be larger. For instance, in contrast to focusing strictly on individual development, Lazear (2001) emphasizes the inherent public good aspect of educational production in a classroom environment where one student can disrupt the teaching process and, as a result, impede the learning of fellow classmates. Clarifying the extent to which food insecurity changes children's classroom performance, and for which measures, can help determine the potential for negative externalities.[5] From a policy perspective, drawing a clearer picture of what contributes to classroom behavior, especially behavior that is not conducive to learning, is a critical step in determining the optimal funding of public assistance programs. The aggregate social cost of food insecurity may justify more policy intervention and spending considering the widespread use of classroom-based education in public schools throughout the U.S. as Borjas (2004) find that, on average, public assistance programs reduce the probability of households experiencing food insecurity by relaxing household financial constraints. Our findings suggest the benefits of welfare programs aimed at reducing the prevalence of food insecurity may be larger than previously thought for young children.

In particular, using a panel of 4710 elementary students enrolled in 1st, 3rd, and 5th grade (1999–2003), we estimate fixed effects models of the transitional effects of food insecurity experiences on children's non-cognitive skill development. We find that food insecurity decreases children's non-cognitive performance in the classroom by nearly one-half a standard deviation, on average. However, the particular pattern of temporal occurrence determines a large share of the negative effect as we find that children experiencing an early transition from food insecurity in 1st grade to food security in 3rd grade have even larger developmental impairments that persist through the 5th grade. This study provides the strongest empirical evidence to date that food insecurity negatively affects the non-cognitive development of children.

Findings from related studies are discussed in Section 1. The estimation strategy and data sources used in the analysis are described in Section 2. We present the results in Section 3, and Section 4 concludes and discusses key policy implications.

2. Effects of food insecurity on children

A large share of the literature investigating the influence of food insecurity on children is concerned with assessing its impact on nutrition and body size. While food shortages in a household have the potential to cause a reduction in the quality and quantity of meals, there has been limited empirical evidence of food insecurity affecting school-age children's nutritional status. Using cross-sectional data, Bhattacharya et al. (2004) find that food security indicators do not predict nutritional measures of children age 6–11 years after controlling for household poverty levels. Similarly, Kirkpatrick and Tarasuk (2008) find no prevalence of nutrient inadequacy for children age 1–8 years according to food insecurity status, but do find small differences for children age 9–18 years for protein and certain

[2] For instance, see Murphy et al. (1998), Alaimo, Olson, and Frongillo (2001), Alaimo, Olson, Frongillo, and Briefel (2001), Dunifon and Kowaleski-Jones (2003), Winicki and Jemison (2003), Cook et al. (2004), Ashiabi (2005), and Jyoti et al. (2005).

[3] We interpret our outcomes as measuring categories of "non-cognitive" skills; other labels such as psychosocial outcomes, socioemotional abilities, soft skills, or social skills are generally interchangeable.

[4] The evidence suggests that schooling largely affects future earnings through mechanisms beyond improvements in cognitive functioning alone. Bowles, Gintis, and Osborne (2001) provide a nice discussion of the determinants of individual earnings.

[5] Economists have long been concerned with quantifying peer effects in the context of academic achievement and behavior; see (Ding & Lehrer, 2007; Figlio, 2007), and (Argys & Rees, 2008) for recent empirical studies.