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Early childhood WIC participation, cognitive development and academic achievement☆

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ABSTRACT

For the 22% of American children who live below the federal poverty line, and the additional 23% who live below twice that level, nutritional policy is part of the safety net against hunger and its negative effects on children's development. The Special Supplemental Nutrition Program for Women, Infants and Children (WIC) provides steadily available food from the food groups essential for physical and cognitive development. The effects of WIC on dietary quality among participating women and children are strong and positive. Furthermore, there is a strong influence of nutrition on cognitive development and socioeconomic inequality. Yet, research on the non-health effects of U.S. child nutritional policy is scarce, despite the ultimate goal of health policies directed at children—to enable productive functioning across multiple social institutions over the life course. Using two nationally representative, longitudinal surveys of children—the Early Childhood Longitudinal Study, Birth Cohort (ECLS-B) and the Child Development Supplement (CDS) of the Panel Study of Income Dynamics—I examine how prenatal and early childhood exposure to WIC is associated in the short-term with cognitive development, and in the longer-term with reading and math learning. Results show that early WIC participation is associated with both cognitive and academic benefits. These findings suggest that WIC meaningfully contributes to children's educational prospects.

1. Introduction

Among children in the United States, poverty and low economic status are pervasive and consequential. Over 16 million, or about 22% of U.S. children, live below the federal poverty line, with an additional 30 million children living below twice the poverty line—45% of U.S. children and youth live in poor or low-income families, and several decades of research reveal the negative effects of early childhood economic disadvantage on skill development, health and socioeconomic attainment (Duncan et al., 2010; Finch, 2003; Reiss, 2013; Schmeer, 2012). Poverty and food insecurity (uncertainty about the financial ability to provide the next meal) go hand in hand and, for children in economically disadvantaged and food-insecure households, nutritional policy is part of the social safety net to protect against the negative effects of hunger. One such program, the Special Supplemental Nutrition Program for Women, Infants and Children (WIC), provides the benefit of steadily available food from the food groups essential for physical and cognitive development, as well as educational resources to enable healthy choices. Unlike the federal food stamp program (SNAP), WIC vouchers can be used on only specific food products. The program serves a large segment of American children—in 2009, 50% of U.S. infants and about 25% of pregnant women, postpartum women, and children ages 1–4 years participated in WIC (Oliveira and Frazao, 2009).

Beyond its broad reach, the influence of WIC on dietary quality among pregnant women and young children is strong and positive, and there is a strong influence of nutrition on cognitive development and socioeconomic inequality (Behrman et al., 2009; Bitler and Currie, 2005; Kowaleski-Jones and Duncan, 2002). Moreover, WIC overlaps with critical and sensitive periods of developmental plasticity, and mounting evidence suggests that intervention during the first five years of life is particularly beneficial for brain development (Shonkoff and Phillips, 2000). Yet, research on the cognitive and academic effects of U.S. childhood nutritional policy is scarce, despite substantial evidence of the effects of nutritional intervention on human capital development in developing countries (e.g., Behrman et al., 2009). Using

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data from two nationally representative, longitudinal surveys of children—the Early Childhood Longitudinal Study Birth Cohort (ECLS-B) and the Child Development Supplement (CDS) of the Panel Study of Income Dynamics—along with rigorous statistical techniques, I examine how children's early WIC participation is associated in the short-term with cognitive development, and in the longer-term with reading and math achievement. The data sources used here permit me to measure in utero WIC exposure, and to compare children who are exposed to WIC in utero to those who are not. Because many children who receive in utero exposure also participate later in childhood, my results capture the relationship of prenatal *and* early childhood WIC participation with cognitive development.

2. Background

2.1. Child health and educational opportunity

The socioeconomic gradient in children's health is well-established, whereby those in highly educated and higher-income families have better health than those with fewer resources to draw from (e.g., Chen et al., 2006; Dowd, 2007; Finch, 2003). Building on longstanding evidence on the social distribution of health, mounting evidence reveals an equally strong association between early-life health and both opportunities for academic progress in the short-term (e.g., skill development, achievement) and socioeconomic attainment in the longer-term (e.g., job loss, prohibitive health care costs) (Conley et al., 2003; Palloni et al., 2009).

Most research on health and social stratification examines long-term processes. However, much of the influence of child health on longer-term social processes works through the emergence of disparities in cognitive development and academic learning early in life. Birthweight and other measures of prenatal and infant health, as well as health around the time of school entry, are associated with academic achievement (e.g., Cheadle and Goosby, 2010; Crosnoe, 2006). Moreover, adjusting for differences in cognitive skills and academic achievement explains the influence of child health on socioeconomic attainment (Jackson, 2010; Palloni et al., 2009). Overall, the weight of evidence suggests that unhealthy exposures or health disadvantages in a sensitive period of human development affect children's readiness to learn and to effectively participate in academic curricula, producing baseline inequalities in skill development and learning. These inequalities may compound as children age and result in striking differences in attained education and earnings.

2.2. WIC as a measure of early childhood health environments

Though the policy debate surrounding nutrition in Western nations often emphasizes the effects of overweight and obesity, micronutrient deficiencies are also prevalent and increasing (CDC, 2002). Rather than targeting one deficiency, WIC provides steadily available nutritious food. Target families are at or below 185% of the federal poverty threshold and women must also demonstrate that they are nutritionally at risk, which is true for the overwhelming majority of participants. Women who participate in other federal assistance programs (SNAP, TANF, Medicaid) are also automatically eligible. WIC is fully federally funded and administered by states.

In contrast to SNAP, nutritional content from major food groups is federally mandated for WIC. A pregnant woman, for example, can purchase cereal, milk, fruits and vegetables, whole grains and legumes. An older infant (ages 6–11 months) is eligible to receive formula, infant cereal and baby food (fruit, vegetables, meat) (Oliveira and Frazao, 2009). Perhaps because of the strong nutritional component of WIC benefits, program participation has positive effects on birth outcomes and the quality of children's diets. Pregnant women and their young children who participate in WIC have higher nutrient intake than their similar peers who do not, based on both observational and experimental study designs (Fox et al., 2004; Metcoff et al., 1985; Rush et al., 1988). In addition, mothers who participate in WIC are more likely to have babies with a healthy birthweight, an important indicator of fetal growth and maternal nutrition (Bitler and Currie, 2005; Foster et al., 2010; Kowaleski-Jones and Duncan, 2002; Owen and Owen, 1997; Rossin-Slater, 2013). A parallel body of research documents the relationships among nutrition, cognitive development and academic achievement around the world, whether measured by iron-deficiency anemia, height, or policy participation (Behrman et al., 2009; Glewwe and King, 2001). Appropriate weight gain during childhood and iron supplementation among anemic children, for example, increases test performance and learning capacity, with the primary pathway believed to operate physiologically through changes in the structure and function of the central nervous system, and structurally through a heightened ability to focus in the classroom (Martorell et al., 2010; Grantham-McGregor and Ani, 2001; Roncagliolo et al., 1998).

While the nutritional aim of WIC—namely, providing supplemental access to healthy foods that improve the dietary quality and health of participating pregnant women and their babies—is key, the program also has educational aims. WIC participants are offered the opportunity to enroll in nutrition education classes that inform caregivers about the nutritional needs of children, the benefits of breastfeeding, and the importance of physical activity. Participants also receive assistance in accessing other health care services. The availability of different types of benefits via WIC means that participants likely benefit directly (via their ability to obtain foods essential to healthy child development) and indirectly (via increased knowledge about healthy choices).

2.3. WIC participation, cognitive development and academic achievement

WIC participation is a goodmeasure of prenatal and early childhood nutrition and health environments, which are in turn strongly linked to cognitive development, academic learning, and eventual socioeconomic attainment. Such evidence provides a strong rationale for examining the non-health effects of children's participation in the program. Little evidence, however, extends this examination to cognitive development and academic progress. A small body of research links children's WIC participation to improvements in cognitive functioning and academic progress, finding that children who participate in the program at some point during the period of eligibility have stronger skill development in early childhood (Hicks et al., 1983; Rush et al., 1988). Much existing work relies on clinical samples and uses cross-sectional data, making it difficult to track children's progress and appropriately measure their other circumstances.

I use national data to examine the association of WIC participation with cognitive development in the short term and academic progress in the longer term. Research examining how child health influences the development of academic inequality throughout the school years suggests a cumulative process that begins early and grows over time (e.g., Cheadle and Goosby, 2010). Whether disparities in skill development and learning grow as children age (Magnuson et al., 2012) or emerge early but remain stable as children age (Schady et al., 2015), WIC participation may be associated with a learning advantage that persists beyond the period of program participation into the school years.