The Timing of SNAP Benefit Receipt and Children's Academic Achievement

Specific aims and significance. The largest food assistance program in the U.S. and an important part of the U.S. safety net, the Supplemental Nutrition Assistance Program (SNAP) provides cash-like benefits to low-income individuals and families to use only for purchasing food. Understanding how SNAP benefit receipt affects children and families is crucial to both research and policy efforts aimed at supporting the healthy development of low-income children.

This paper will link the timing of SNAP benefit receipt to children's end-of-grade (EOG) and end-of-course (EOC) achievement test scores in North Carolina (NC), where, importantly, timing of benefit receipt within the month varies randomly at the household level. The specific aims are: (1) To examine whether recency of SNAP benefit receipt affects children's achievement test scores, by comparing children who take EOG and EOC tests at the beginning of their families' monthly benefit cycle to children who take tests at the end of their families' benefit cycle; (2) To investigate whether this relationship varies by child characteristics, such as gender and race/ethnicity; (3) To examine whether this relationship varies for children in communities with different characteristics, such as high vs. low unemployment.

Addressing these aims could have implications for inequality between low-income and higher-income children. Performance on achievement tests provides information on children's cognitive functioning. If at the end of families' SNAP benefit months children have reduced cognitive functioning, then there is a portion of each month in which children in SNAP-receiving families are operating with reduced cognitive functioning. In contrast to SNAP recipients, there is no evidence that higher-income families experience monthly cyclical food insecurity and thus, higher-income children's cognitive functioning is unlikely to be affected by that type of cyclicality. Even if, for example, SNAP-receiving children are only affected for three days per

month, over the course of a school year, these experiences will accumulate as a 10% decline in the share of schooling for which SNAP-receiving children are fully attentive relative to their higher-income peers. This accumulation over the school year may, in part, explain test score gaps between low-income and higher-income children.

Relevant literature. Although SNAP improves families' economic well-being (Tiehen, Jolliffe, & Gunderson, 2012), little research has examined how SNAP affects other aspects of family well-being, such as children's development. The initiation of SNAP in the 1960s decreased low birth weight and infant mortality (Almond, Hoynes, & Schanzenbach, 2011) and serious physical health problems (Lee & Mackey-Bilaver, 2007). Little research has examined children's outcomes in domains other than physical health (Gassman-Pines & Hill, 2013). SNAP may affect children in other domains through improvements in family functioning, as families' economic circumstances improve (Gershoff, Aber, Raver, & Lennon, 2007).

The recency of SNAP benefit receipt is related to families' nutrition and caloric intake. SNAP recipients consumed significantly fewer vegetables and milk products, spent less on food, and took in significantly fewer calories at the end of the month, compared to the beginning of the month (Hastings & Washington, 2010; Shapiro, 2005; Tarasuk, McIntyre, & Li, 2007; Wilde & Ranney, 2000). Although there is significant instability in SNAP recipients' nutrition and dietary choices throughout the month, it is unknown whether families also experience within-month variability in other important outcomes, such as stress and family interactions, that are linked to children's cognitive functioning and test performance (Eysenck, Derakshan, Santos, & Calvo, 2007; Pianta & Egeland, 1994). Additionally, there is evidence that changes in nutrition directly affect students' test scores (Figlio & Winicki, 2005).

The relationship between SNAP benefit receipt and children's test scores may vary by child and community characteristics. Girls experience more negative consequences of declines in family economic status than boys (Elder & Caspi, 1988) and may also be more strongly affected by family economic supports. Black children live in households with lower incomes and fewer assets (Darity & Nicholson, 2005) and minority workers are more vulnerable to the effects of economic downturns than white workers (Kletzer, 1998). Minority children may live in families that rely more heavily on SNAP and may be more strongly affected by the timing of SNAP receipt. My own work has shown that community-wide economic change affects all children in a community (Ananat, Francis, Gassman-Pines, & Gibson-Davis, 2013; Ananat, Gassman-Pines, & Gibson-Davis, 2011, 2013). Thus, areas with high unemployment, for example, may provide a more challenging context for learning that will alter the relationship between the recency of SNAP benefit receipt and test scores.

Research design, methodology, and data sources. Data on student test scores have been provided by the North Carolina Education Research Data Center (NCERDC), which maintains all public school students' administrative records and makes them available to researchers, through an ongoing cooperative agreement with the NC Department of Public Instruction. All 3rd- through 8th-grade students in NC are required to take EOG achievement tests in reading, math and science. High school students take EOC tests in certain subjects, such as English I, Algebra I, and Biology. This project will utilize EOG and EOC test scores from the 2011-2012 and 2012-2013 academic years. Although schools are given some flexibility in scheduling EOG and EOC tests, tests are generally scheduled within the last 15 days of the school year. The exact date that students took the EOG and EOC tests are available in the NCERDC test scores files. In the 2011-2012 academic year, there were about 1,100,000 public school students in grades 3-12

in NC. Across grades, 56% of students were economically disadvantaged, as proxied by eligibility for free- or reduced-price lunch; students were racially and ethnically diverse.

Data on students' SNAP benefit receipt have been provided through a cooperative agreement between me and the Division of Social Services in the NC Department of Health and Human Services. The SNAP data include recipient children's names, birth dates, and addresses, as well as benefit amounts and date of benefit transfer. In 2012 and 2013, there were approximately 527,000 children ages 8-18 receiving SNAP in NC.

Research staff at the NCERDC are in the process of matching of the student test score data with the SNAP administrative data. Approximately 80% of SNAP-receiving children have been matched with their test scores. Prior experience with matching administrative data sources to the NCERDC student data indicate that after all matching is complete, an even higher share of children will be matched.

Important to my design, in NC, SNAP benefits are disbursed at different points in the calendar month, determined by the last digit of the recipient's social security number (SSN) (e.g., 3rd of the month if SSN ends in 1). When EOG and EOC tests are administered within a school, some children in SNAP-receiving families are in households that have just received benefit payments but other children are in households at the end of their monthly cycle. Comparing test scores for these children provides information about the effect of SNAP benefit receipt on test performance, holding constant the share of children in a school who receive SNAP (this control would not be possible in a state where all families receive benefits on the same date). Thus, this study is a quasi-experiment where the treatment is recency of receipt of monthly SNAP payment. The distribution of treatment is essentially random, as it is determined only by the last digit of participants' SSNs. Differences in test scores that are found are unlikely to be due to systematic

differences between children, because those who are at the beginning of their families' monthly cycle are likely the same, or highly similar, to those at the end of the cycle.

I will use OLS regression, with the following equation:

$$Score_{is} = \beta_n Days_{is} + \beta_2 Grade_{is} + \beta_n X_{is} + \alpha_s + \varepsilon$$

Where *Score* is the EOG or EOC test score of a given student *i* in school *s* in a given subject; *Days* is a set of indicator variables representing each day that has elapsed between the student's receipt of SNAP benefits and the date of the test; *Grade* is the student's grade; *X* is a vector of student characteristics; and α_s are school fixed effects. This approach models the relationship between SNAP benefit receipt and test scores flexibly, allowing for the investigation of discrete changes at certain points during the month. The school fixed effects increase the precision of the estimates by removing variance in children's test performance that is due to stable school characteristics, whether measured or unmeasured.

To examine moderation by student characteristics, I will include *Days**student characteristics interaction terms in the main model specification. I will examine student age, gender, race/ethnicity, and prior-year academic achievement. To examine moderation by community characteristics, main effects for community characteristics and interaction terms between community characteristics and *Days* will be included in the model. I will examine local unemployment, percent of the population living in poverty, and availability of social services. I will gather data on community characteristics using an NC public data clearinghouse, NC LINC.

Hypotheses and implications. I hypothesize that children who are tested at the beginning of their families' monthly benefit cycle will score higher on EOG and EOC tests, compared to children who are tested at the end of their families' benefit cycle. Although this project will not enable me to draw causal conclusions about the effect of SNAP benefit receipt (vs. not receiving

SNAP) on children's test scores, it will enable me to understand how cyclical nutrition deficits due to the timing of SNAP benefits affects children's achievement. As described above, these recurring deficits may lead to inequality in the long-term outcomes of children in low-income and high-income families. Because the monthly lump-sum distribution of this important social safety net program is a policy choice, understanding how this mode of delivery affects children's academic achievement and may lead to increased inequality between low-income and higher-income children will be of interest to policymakers.

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