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The Effects of Head Start Participation on Child Health From Kindergarten to the 5th Grade

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Started as part of the war on poverty in 1965, Head Start has been one of the major large-scale, publicly financed educational and care programs for disadvantaged preschool children and their families in the U.S., especially those living in poverty. The primary goals of Head Start program are to provide comprehensive and high quality services for disadvantaged children, especially those from low-income families, to improve their school readiness, social competence, learning skills, health, and nutrition in order to keep up with their peers (Head Start Bureau (HSB), 2006; Aughinbaugh, 2001; Blau, 2001). Children in Head Start receive free services, including early education and development, medical, dental, mental health, nutrition, parental involvement, and other social services (Smolensky & Gootman, 2003; HSB, 2006).

In particular, Head Start programs work with parents to determine the health status of children, screen for developmental and behavioral problems, and provide individualized treatment and ongoing health care as well as extended follow-up (HSB, 2006). Therefore, the emphasis of Head Start program on nutrition and health care should be expected to have immediate and persisting positive effects on the health of participants. Most studies on Head Start have focused on cognitive and school achievement outcomes, but few have directly examined child health indicators, particularly the affecting patterns of Head Start when children are growing. Moreover, the effects of Head Start in general have been a continuous debate, which is largely due to the lack, until recently, of a randomized assignment of Head Start participation. As a result, selection bias has been a critical issue in evaluating the effects of Head Start because observable and unobservable factors relevant to disadvantaged families, such as low-income, low parenting skills, single parenthood, and parental stresses, could affect both the selection into Head Start program and the outcomes of participants, which might bias the estimation of "true" effects of Head Start.

Some early studies find negative to small gains on health by Head Start participants, but most of these studies suffer from research method flaws in addressing the issue of selection bias. Recent well-designed research has found some substantial positive short- and long-term effects of Head Start on the health of participants. For example, to address the issue of selection bias, the studies by Currie and Thomas (1995, 1999), Garces, Thomas, and Currie (2002), and Anderson et al. (2004) use mother-fixed effects models, controlling for time-invariant observed and unobserved differences within the families, to compare the outcomes of children who participated in Head Start with those of their siblings who did not. They find that Head Start participation is associated with positive and significant gains in health, such as less likely to smoke cigarettes or be overweight. One limitation of sibling comparison or mother-fixed effects models is that only time-invariant observed and unobserved differences within individual families are controlled for, while some time-varying family characteristics such as household structure, parents' employment status, and family income, which might affect both individual children's eligibility for Head Start and health status, are largely omitted.

Furthermore, Ludwig and Miller (2005) adopt another approach, regression discontinuity, to identify the long-term effects of Head Start on health and schooling of participants. By comparing outcomes in treatment and control groups, they find that Head Start participation is associated with a large drop in mortality rates. One weakness of this study is that some unobserved factors correlated to both the outcomes and the discontinuity of Head Start funding and participation rates could exist, which could have biased their findings. In addition, since the analysis is conducted at county level, it is impossible to identify Head Start effects on individual participants. In contrast, Magnuson, Meyers, Ruhm, and Waldfogel (2004) and Magnuson, Ruhm, and Waldfogel (2005) use secondary data and rich controls to examine Head Start effects

and find that Head Start participation is associated with reduction in self-control and increase in externalizing problem behaviors. One problem of these two studies is that they categorize children who received two or more types of child care arrangements as in the type with longer time. As a result, the comparison is among a set of mixed types of child care arrangements, which might have masked the "true" effects of Head Start.

In addition, in their evaluation of the randomized Head Start experiments conducted since the mid-1990s, Love et al. (2002) and Puma et al. (2005) report that Head Start program has lifted the social-emotional development of children, particularly in health status and reduction in problem behaviors. As the "gold standard" for causal inference, randomized experiments are the ideal tool for the evaluation of Head Start effects. However, one critical limitation of these two experiment studies on Head Start is that, although children in the treatment group received Head Start services, their peers in the control group received other child care arrangements ranging from exclusively parental care to other center-based care. Such a mixed counterfactual makes it hard to identify the "true" effects of Head Start as compared to a specific alternative (e.g., exclusively parental care).

To summarize, the effects of Head Start on child health have been under-studied in the literature and a limited number of well-designed studies show some flaws in research methods. This study aims to address such gaps in the knowledge about Head Start effects by examining the effects of Head Start participation prior to kindergarten on child health outcomes from the fall kindergarten through the 5th grade using advanced statistical methods. The research questions include whether Head Start participants are less likely to be overweight or suffer from obesity, whether they are more likely to have diagnosed problems of learning, attention, activities, speech, hearing, or vision, and whether they have overall better health status, health care, and insurance plan, compared to children whose socioeconomic backgrounds are similar but were not enrolled in Head Start programs. In addition, this study will consider whether the intensiveness (i.e., hours per week) or duration (i.e., number of months per year and total years attended prior to primary school) of attending Head Start program matter and how the effects of Head Start on child health vary by the race/ethnicity of participants.

This study will conduct secondary data analysis using data from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K). ECLS-K focuses on the early school experiences of children beginning from kindergarten with detailed information on children's cognitive, social, emotional, and physical development, children's home and school environments, educational practices, classroom curriculum, and teacher qualifications. A nationally representative sample of approximately 22,000 children enrolled in about 1,000 kindergarten programs during the 1998-99 school year were selected for participation in the study. This study will use currently available ECLS-K data collected in fall kindergarten (1998), spring kindergarten (1999), 1st grade (spring 2000), 3rd grade (spring 2002), and 5th grade (spring 2004). The ECLS-K longitudinal data also include information from the Head Start Verification Study, which was designed to identify Head Start participants in ECLS-K and to verify their attendance through contacts with the Head Start centers they reported (Tourangeau et al., 2001). This study will use verified data of Head Start participation in the year prior to kindergarten (1997-1998) by the Head Start Verification Study.

The outcome variables of overweight and obesity will be measured by body mass index based on the items related to child age-based weight and height in ECLS-K. The diagnosed problems focus on whether child has been diagnosed of learning, attention, activity, speech, hearing, and vision problems, as reported in ECLS-K. Child health status and care is measured

by the overall health status, doctor visit, and health insurance reported by mother in ECLS-K. In addition to Head Start, other child care arrangements include exclusively parental care, relative care, non-relative care, other center-based care, and mixed child care. Other covariates include the rich information in ECLS-K on the demographics and other characteristics of child, parents, family, teacher, and school.

In terms of research methods, this study will first identify a comparable or matched control group to Head Start participants (treatment group) based on propensity score matching method, and then examine the differences between the health outcomes of Head Start participants and those of children in the matched control group using general binary and multinomial logistic regression and county and school fixed effects models. As a technique to reduce selection bias in observational studies, propensity score matching has been introduced and increasingly used in evaluating the effects of early childhood education and care programs in recent years (e.g., Hill, Waldfogel, & Brooks-Gunn, 2002; Hill, Brooks-Gunn, & Waldfogel, 2003; Shonkoff & Philips, 2000). It uses observed covariates to estimate the probability of treatment (i.e., the propensity score) and then, for each member in treatment group, identifies a "matched" member in control group with the closest propensity score. Under the assumption that the predictive covariates are the only confounding variables, those with similar propensity scores can be conceptualized as randomly assigned to treatment or control groups in an experiment (Hill, Waldfogel, & Brooks-Gunn, 2002).

The analysis will include two stages. In the first stage, this study will use pre-treatment (prior to Head Start attendance) variables, including child experienced low birth-weight or prematurity, race and ethnicity, family structure, urban or rural residency, number of grandparents living, whether only English is spoken at home, household income-to-needs ratio, and whether families had ever received WIC, TANF, or food stamps, to predict the probability of attending Head Start (propensity score) of each child. State-fixed effects will be used in the predictive model to capture observed and unobserved state level factors in determining Head Start eligibility and attendance. In the second stage, based on the propensity scores, two strategies will be adopted to evaluate the effects of Head Start. The first strategy is to divide the sample into strata based on the propensity scores. As a result, children within the same strata should be similar and thus comparable in terms of their probabilities of attending Head Start. To examine Head Start effects, this study will use general OLS and school- and teacher-fixed effects models. The second strategy is to pull out individual Head Start participants and their non-participant peers whose propensity scores are just next to them as separate units. As a result, children in the same units can be conceptualized as twins or siblings in a family with respect to the probabilities of Head Start attendance. In theory, children in the treatment and control groups will be more closely matched and thus more comparable than those from the first strategy.

Although limited evidence shows the dosage effects of other early childhood education care programs (e.g., Hill, Brooks-Gunn, & Waldfogel, 2003), few studies have considered the dosage effects of Head Start. In this study, the dosage of Head Start refers to the intensiveness (measured by hours per week in the year prior to kindergarten reported by parents) and duration (measured by the number of months in the year prior to kindergarten reported by parents and the length between the year of child's first attending Head Start and the year prior to kindergarten of Head Start attendance). To evaluate the dosage effects of Head Start on child health, the analysis will be conducted within three separate models. The first model will examine the effects of intensiveness of Head Start participation in the year prior to kindergarten. The Head Start participants will be divided into three groups—low intensive, middle intensive, and high

intensive groups—based on the hours per week that child attended in Head Start. The second model will focus on the effects of the total months that child had attended Head Start. Head Start participants will be grouped into three sub-samples with low duration, middle duration, and high duration based on the total months of their attending in Head Start in the year prior to kindergarten. The third model will take into account of child's age of first attending Head Start and explore whether Head Start has different effects on the health of participants who started at age 3 or younger, age 4, or age 5 and older. As a result, this study will be able to justify whether Head Start has different effects on the health of children whose attendance of Head Start varied by the intensiveness (i.e., hours per week) and duration (i.e., number of months per year and total years attended prior to primary school).

Using advanced methods (propensity score matching and fixed effects) to address the issue of selection bias and to simulate random assignment with verified Head Start participation data, this study will provide reliable findings to update and advance the evidence of Head Start effects on child health from kindergarten to the 5th grade year for researchers, policymakers, administrators, as well as practitioners. Considering the emphasis of health prevention and treatment services provided by Head Start programs, we may expect that this study will find positive effects of Head Start on child health, but the magnitude of the effects may vary by health indicator and be diminishing overtime, as those have been found on cognitive gains of Head Start programs in the literature.

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