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This issue includes a summary of work that was presented at the Institute for Research on Poverty's "Intergenerational Transmission of Poverty: Research on the Early Years of Life" conference held at the University of Wisconsin–Madison in April of 2016. IRP faculty affiliates Jason Fletcher, Katherine Magnuson, and Barbara Wolfe co-organized the event, and attendees included researchers, practitioners, and policymakers. Presenters represented a variety of disciplines, including sociology, economics, psychology, education, public health, and social work. Funding for the conference was provided by U.S. Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation.

The conference focused on how family poverty during the first years of life shapes children's life chances, with attention to both mechanisms of transmission as well as the programs and policies that may be effective in reducing the effects of poverty on early development. The speakers in the conference also touched on the consequences of exposure to many of the disadvantages low-income children face, including child maltreatment, homes with lower levels of cognitive stimulation, violent neighborhoods, and toxins and pollutants.

The topic was timely; research has shown that economic resources and parental investments are increasing for economically advantaged children and youth, while their disadvantaged counterparts experience comparatively fewer investments. Segregation and separation across multiple institutions limit opportunity for the disadvantaged and create further opportunity for the advantaged, thus generating further inequality. The divergence of opportunity for low-income and more affluent groups is both the result of growing income inequality and a likely

cause of future inequality. It may also profoundly affect the life chances of low-income children.

Public policies invest considerable resources in poor families and children with the goal of compensating for early disadvantages. The debate about the costs and benefits of these programs should consider the extent to which they protect vulnerable children from potential harmful developmental effects of poverty, as the long-term consequences are likely important for future inequality and productivity. The work presented in this issue provides information important to this discussion.

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Focus is free of charge, although contributions to the UW Foundation–IRP Fund sent to the above address in support of *Focus* are encouraged.

Edited by Emma Caspar

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Intergenerational transmission of income inequality: What do we know?

Gary Solon

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This article presents a brief overview of current knowledge about intergenerational persistence of economic status in the United States, that is, the extent to which position in the income distribution is passed from one generation to the next.

What is intergenerational income mobility, and why does it matter?

My favorite way to summarize this topic and explain why we should care about it is to tell a tale of two societies: Society A and Society B. These two societies have identical income distributions, and thus at first glance appear to have the same income inequality. But actually there's a difference. In Society A, a child growing up in a wealthy family at, say, the 93rd percentile of the income distribution is certain to end up as an adult at exactly the 93rd percentile in her or his own generation. A child growing up in the 12th percentile is certain to end up at the 12th percentile. Society A is therefore an entirely immobile society, where one's position in the income distribution is predestined by one's origins. In Society B, which has the same income distribution and thus the same degree of inequality at a point in time, the child from the 93rd percentile and the child from the 12th percentile share the same prospects. Because there is no connection between the children's origins and where they will end up in the income distribution, Society B is a perfectly mobile society. Thus, although at first glance the two societies seem equally unequal, they differ in the nature of their inequality. I expect that most people would like to know where our own society lies between the extremes of Society A and Society B.

Measuring intergenerational income mobility

To answer that question calls for a statistical way of characterizing a society's intergenerational mobility. Many mobility researchers use a regression framework that relates a child's expected long-run income to that of the child's parents. When both generations' income is measured in a certain relative way, the coefficient in the regression equation is the "intergenerational income elasticity." The intergenerational income elasticity tells what percentage variation to expect in the child's income in connection with a percentage variation in the parents' income. For example, if the intergenerational income elasticity is 0.4, and the parents' income is 50 percent above the average in their generation, then the expected position for the child would be 20 percent (0.4 times 50 percent) higher than the average in the child's generation. If the intergenerational income elasticity is 0, then the child's expected relative income is unrelated to whether the parents are rich or poor (as in Society B above). As the intergenerational income elasticity grows larger, we move towards Society A, with children from rich families enjoying a large advantage relative to children from poor families.

This regression framework is not the only possible way to characterize intergenerational income mobility, but it has become popular because (1) it conveniently provides a single summary statistic for characterizing intergenerational income mobility in a society; and (2) it lends itself well to analyzing estimation biases from measurement error and unrepresentative samples. Like any single summary statistic, it misses a lot of nuance, but it is a convenient starting point.

What we used to "know" and why it changed

As of the mid-1980s, the conventional wisdom among academic sociologists and economists was that the intergenerational income elasticity in the United States and elsewhere was no more than 0.2.[1] These low estimates implied a highly mobile society in which children from rich and poor families competed on a nearly level playing field.

As it turns out, these early estimates were distorted by certain statistical problems. To begin with, although we are mainly interested in long-run income, the intergenerational income data available at the time were short-term measures (often for only one year) collected from household surveys. Such a measure is not a very accurate indicator of longer-term income, both because survey reports of income are notoriously error-ridden, and because year-to-year income fluctuations cause even an accurately reported single-year measure to be an imperfect indicator of longer-run income. Even if the resulting income measurement error were purely random, this "muddying of the water" would lead to substantial underestimation of the intergenerational income elasticity.

A further issue, highlighted in my own first papers on intergenerational mobility, is that the early researchers had a difficult time locating data containing income measures for two generations of the same families, and the data these

researchers had to settle for happened to involve peculiarly homogeneous samples.[2] For example, the fathers in one sample were drawn from a sample of white male twin pairs in which both members of the pair served in the armed forces and cooperated with a succession of surveys.[3] Such a sample contains less variation in economic status than exists in the larger population. My first papers explained why this compressed variation in parental status aggravates the downward bias from measurement error, leading to even more severe underestimation of the intergenerational income elasticity than there would be in a more representative sample.

What we have learned from better evidence

Since these early studies, newly available data have enabled more accurate estimates of intergenerational income mobility. An example of such data is the Panel Study of Income Dynamics (PSID), a longitudinal survey administered by the University of Michigan's Survey Research Center. It began in 1968 with a national probability sample of the U.S. population, and it has followed the sample ever since. The PSID data have an intergenerational span because the children from the original sample have been followed as they have grown up and formed their own households. The PSID has two major advantages relative to previous data sets. First, the multi-year measurement of income enables exploration of effects of using longer-run income measures. Second, the PSID's national probability sample avoids the homogeneity issues of the earlier data sets.

The importance of the better data is exemplified by my own first PSID-based study of intergenerational mobility, which estimated the relationship between son's annual earnings in 1984 and father's earnings over the 1967 to 1971 period.[4] When I imitated earlier research by using only one year of father's earnings at a time, the resulting estimates of the intergenerational elasticity were about 0.3. Because of the short-term earnings measure, these estimates were underestimates, but they still were larger than estimates from the previous literature because of the less homogeneous sample. When I proceeded to use longer-term (five-year average) earnings measures for fathers, my estimates rose to about 0.4, or about twice what previously had been believed to be the upper bound.

Even this higher estimate was an underestimate of the actual intergenerational elasticity for three reasons: (1) even a five-year average is a somewhat inaccurate measure of longer-run income; (2) the PSID survey response rate decreases over time in a way that makes the PSID sample somewhat more homogeneous than the U.S. population; and (3) the average age at which the sons' earnings were measured was slightly under 30. Subsequent research has shown that income variation observed in the twenties tends to understate long-run variation.[5]

What difference does it make if the intergenerational income elasticity is 0.4 or 0.5 instead of 0.2? Table 1 illustrates the probability that a child from a very poor family (in the 5th percentile of their generation's income distribution) will: (1) rise above the 50th percentile as an adult, or (2) remain in the bottom 20 percent. The table considers four scenarios of what the intergenerational income elasticity is, and it assumes that the relative income measure is normally distributed in each generation. So, for example, given the zero intergenerational elasticity of Society B in our initial scenario, the child has a 50-50 chance of being in the upper half of the income distribution, and exactly a 20 percent chance of being in the bottom 20 percent. As the intergenerational income elasticity increases, the probability of the child rising above the 50th percentile as an adult falls, while the probability of remaining in the bottom 20 percent rises. Thus, given a 0.5 intergenerational elasticity, the probability of a child moving from the 5th income percentile to the top half of the distribution is only 17 percent, while the probability of remaining in the bottom 20 percent is nearly 50 percent.

Table 1
Probability of Adult Income for Child from Family in the 5th Income Percentile

Intergenerational Income Elasticity	Rises Above 50th Percentile	Stays in Bottom 20 Percent
0	50%	20%
0.2	37	30
0.4	24	42
0.5	17	49

Because these calculations are based on an arbitrary normality assumption, it is worth cross-validating them against more direct evidence. A recent study by Chetty, Hendren, Kline, and Saez used data from millions of federal income tax records to study intergenerational mobility.[6] Because Chetty and colleagues measured the second generation's income for only two years around age 30, they exaggerated the extent of mobility, estimating the intergenerational elasticity at a bit less than 0.4. Still, it is instructive to compare their empirical transition rates to those from the normality-based calculations in Table 1. The numbers from Chetty and colleagues come remarkably close to what Table 1 suggests would apply with an intergenerational elasticity a little below 0.4. They indicate that a child from a family in the 5th income percentile has a 25 percent chance of rising above the 50th percentile as an adult, and a 37 percent chance of remaining in the bottom 20 percent. All these results show that our society is far from the perfect mobility of Society B. Although children from poor families do have a chance of achieving high income as adults, their prospects are not nearly as good as those of children from well-off families.

Policy implications

During the 1980s, as income inequality grew in the United States and many other developed countries, some pundits wrote that growing inequality need not concern us because, although there are winners and losers in the economic

game, everyone has a fair chance to compete on a level playing field. What we have learned from the last 30 years of mobility research is that the playing field is far from level. Children from poor families are at a substantial disadvantage relative to children from well-off families.

This leads us to the question of what ought to be done to give children from poor families a better chance. Each proposed policy intervention needs to be evaluated on the basis of the best available evidence about its likely benefits and costs, but measuring those is a surprisingly difficult task. The articles in the remainder of this issue take up that challenge by examining recent research in five areas, with a goal of identifying cost-effective policies to reduce intergenerational transmission of poverty. The five areas are: parenting young children; K–12 schooling; neighborhood and school setting; childhood health; and early care and education.■

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[1]See, for example, J. Behrman and P. Taubman, "Intergenerational Earnings Mobility in the United States: Some Estimates and a Test of Becker's Intergenerational Endowments Model," *Review of Economics and Statistics* 67, No. 1 (1985): 144–151; and G. S. Becker and N. Tomes, "Human Capital and the Rise and Fall of Families," *Journal of Labor Economics* 4, No. 3, Part 2 (1986): S1–S39.

[2]G. Solon, "Biases in the Estimation of Intergenerational Earnings Correlations," *Review of Economics and Statistics* 71, No. 1 (1989): 172–174; and G. Solon, "Intergenerational Income Mobility in the United States," *American Economic Review* 82, No. 3 (1992): 393–408.

[3]Behrman and Taubman, "Intergenerational Earnings Mobility in the United States."

[4]G. Solon, "Intergenerational Income Mobility in the United States."

[5]See, for example, S. Haider and G. Solon, "Life-Cycle Variation in the Association between Current and Lifetime Earnings," *American Economic Review* 96, No. 4 (2006): 1308–1320.

[6]R. Chetty, N. Hendren, P. Kline, and E. Saez, "Where Is the Land of Opportunity? The Geography of Intergenerational Mobility in the United States," *Quarterly Journal of Economics* 129, No. 4 (2014): 1553–1623.

Poverty and parenting young children

Three panelists spoke on the topic of poverty and parenting young children. Ariel Kalil provided an overview of gaps by family income in child development outcomes, arguing that parenting is a major factor in this gap, and describing some "low-cost, light-touch" interventions that hold promise for strengthening the parenting skills of the disadvantaged. Lawrence Berger presented findings from a study looking at whether increasing income through the Earned Income Tax Credit reduces the incidence of child maltreatment among low-income unmarried families. The study found that increased income was associated with decreases in child neglect and child protective services involvement for this group, particularly for single-mother families. Helena Duch presented evidence from two programs for low-income families designed to promote school readiness through parental engagement, concluding that higher engagement is associated with improvements in some school-readiness measures, and that some simple interventions show potential for increasing the level of parental engagement. This set of articles summarizes their presentations.

The role of parenting in the intergenerational transmission of poverty

Ariel Kalil

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This article presents a brief overview of gaps by family income in some important child development outcomes. I argue that a big part of the mechanism in linking poverty to child development outcomes works through differences by family background in parenting, and I review efforts to narrow gaps in how parents interact with their children by family income. Finally, I describe my current research project, which draws on behavioral economics for insight into how parents make decisions about investing time with their children, how that process might differ by family background, and what promise those findings might hold for intervention efforts.

Achievement gaps by family background

A child's birth circumstances have a large effect on his or her chances in life. Children of parents with high income and more education tend to have higher academic achievement and attainment than do children of parents with lower income and less education. Children who grow up in more advantaged families also have fewer behavior problems, are less likely to become teen parents, and are more likely to attend and to graduate from college. The advantages continue as children become adults; they are more likely than those who grew up poor to have jobs, their earnings are higher, their participation in welfare programs is lower, and they are healthier and live longer.

Figure 1 shows income-related gaps in cognitive and noncognitive school readiness skills for 4-year-old children in the United States. There are large income-related gaps in all three cognitive measures (literacy, mathematics, and language test score); those in the higher income quintiles have higher scores compared to those in lower income quintiles. Although not as pronounced, gaps in behavioral dimensions of school readiness are also present, with incidence of conduct problems and hyperactivity decreasing as income rises. These gaps appear early, well before the start of formal schooling.[1] They also persist through children's schooling years, and grow over time.[2]

Policy efforts intended to close these cognitive and noncognitive gaps have focused mainly on improving schools. While this school-based strategy may be more politically feasible than one that aims to change how parents choose to raise their children, it does not take into account evidence about the inequalities that already exist when children enter school, and does not address the lack of family resources, including parenting skills, that are necessary for effective early childhood development. Although high-quality school-based early childhood education for low-income children can play a role in closing skills gaps by income, it is not a sufficient solution. There has been much recent work showing that early education and care programs work to improve children's life circumstances and are cost effective.[3] It is important to note, however, that these findings are based on small-scale model programs. More research must be done to determine whether these programs can be scaled up to serve all the children who would be eligible for them.

The parenting gap

Inequality begins at home; it develops from the many differences in the ways that all parents, both advantaged and disadvantaged, interact with their children. Compared

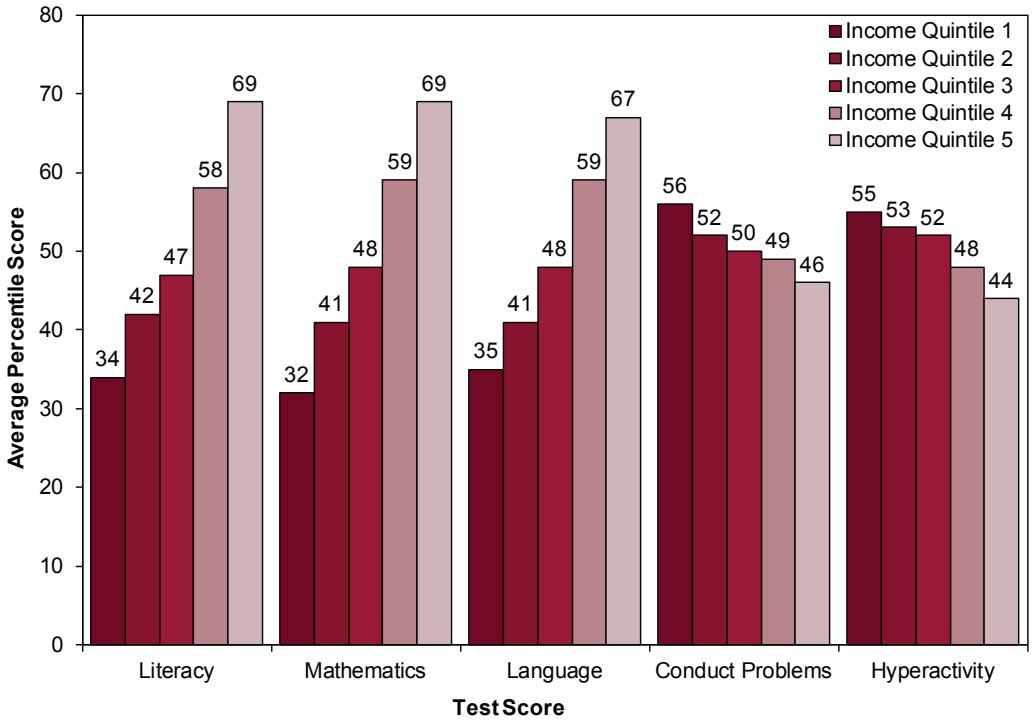

Figure 1. Income-related gaps in school readiness skills for four-year-old children in the United States.
Source: J. Waldfogel and E. Washbrook, "Early Years Policy," *Child Development Research* (2011). Reproduction of figure permitted under open access policy.

to parents with lower income and less education, parents with higher income and more education talk more to their children, are more emotionally engaged, ask their children more questions, have a less punitive approach to discipline, and use more varied vocabulary. In order to be effective, policies aimed at improving children's cognitive and noncognitive skills and closing the gap between children from low- and high-income families must recognize the importance of the family, the mechanisms through which families foster children's skills, and the stress under which many families operate.

Jane Waldfogel and Elizabeth Washbrook conclude that the single most important factor in explaining the poorer cognitive performance of low-income children relative to middle-income children is not income itself, but parenting style, in particular maternal sensitivity and responsiveness. They find that parenting style accounts for 19 percent of the gap in mathematics, 21 percent of the gap in literacy, and 33 percent of the gap in language.[4] They identify the home learning environment as the second most important factor in explaining income-related gaps in school readiness, accounting for between 16 percent and 21 percent of the cognitive gap.[5] Together, these two dimensions of parenting account for a substantial portion of the income-based gap in children's developmental outcomes.

Prior efforts to close the parenting gap

Prior research on the importance of parenting for children's developmental outcomes suggests that gaps in children's skills could be narrowed if less-advantaged parents adopted the parenting practices of their more-advantaged peers. However, large-scale parenting interventions to date have yielded at best modest effect sizes, and often have no long-term effect on children's cognitive skills.[6] There are a number of challenges inherent in fostering parenting and children's skills. First, some of the gaps are not obviously or readily filled by policy; as a society, we have long held the idea that parents should be able to raise their children as they wish. It is much easier to specify desired components for a model preschool program than to dictate specifically how parents should be interacting with their children. Second, most of the programs to date that we consider exemplary have been expensive. Third, many programs that are effective on a small scale may be less effective when scaled up. The final challenge is low take-up and attrition; for the most part, there seems to be a mismatch between what programs are offering and the programs parents seem to want to participate in.

While it may be tempting to conclude from past research that these challenges are too daunting and that policy interventions cannot be expected to change parenting behavior, there do appear to be lessons from behavioral science that can help policymakers understand how to motivate parents to follow the practices that parenting interventions are intended to encourage. Essentially, there are a series of behavioral bottlenecks that stand in the way of parents' aspirations for their children's development and complicate the day-to-day choices parents make in hopes of achieving those desired outcomes. For a variety of reasons, these bottlenecks may present a particular challenge for low-income parents.

One approach to closing the parenting gap: The Parents and Children Together project

A new study that I am leading illustrates the promise that inexpensive interventions hold for moving the needle on this very important issue of parent-child engagement. The Parents and Children Together (PACT) study tests "low-cost, light-touch" interventions designed to increase the amount of time that parents spend reading to their children. All parents in the study received a tablet containing a digital, recordable, story book reading application that they could use to read to their children. In addition, parents in the treatment group set weekly goals, and received daily text message reminders, weekly visual feedback on goal attainment, and social recognition when goals were met.

Over the six-week study period, parents in the treatment group spent an average of 160 minutes reading to their children, while those in the control group read for an average of 66 minutes.[7] This 94-minute difference is statistically significant and substantial. Those in the treatment group read an average of three or four times per week to their children each week, whereas those in the control group read only once a week or not at all to their children. Follow-up work has found that this effect persists for at least three months after the end of the treatment.

Using a standard survey assessment, all parents in the sample were characterized as "patient" or "impatient." The behavioral nudges had a much stronger effect on those identified as impatient (treatment group parents read 130 minutes longer over the study period) than those categorized as patient (treatment group parents read 19 minutes longer). This is not surprising, since the intervention was designed to remind parents of their goals and to provide a framework for them to follow through on their aspirations. "Patient" parents already understood the connections among their aspirations, behaviors, and long-term outcomes; they were thus already reading more minutes than the "impatient" parents, and did not have as much to gain from the intervention.

Policy implications

Many interventions that aim to change parental behavior have had little success, but the Parents and Children Together project shows that a low-cost approach of goal setting and reminders can motivate parents to follow through on their good intentions towards their children. These cost-effective behavioral tools offer a promising way to help parents engage with their children more often and more effectively.■

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[1]J. Waldfogel and E. Washbrook, "Early Years Policy," *Child Development Research* (2011).

[2]M. J. Bailey and S. M. Dynarski, "Gains and Gaps: Changing Inequality in U.S. College Entry and Completion," NBER Working Paper No. 17633, National Bureau of Economic Research, December 2011.

[3]E. I. Knudsen, J. J. Heckman, J. L. Cameron, and J. P. Shonkoff, "Economic, Neurobiological and Behavioral Perspectives on Building America's Future Workforce," NBER Working Paper No. 12298, National Bureau of Economic Research, June 2006.

[4]J. Waldfogel and E. Washbrook, "Income-Related Gaps in School Readiness in the United States and the United Kingdom," in *Persistence, Privilege, and Parenting: The Comparative Study of Intergenerational Mobility*, eds. T. M. Smeeding, R. Erikson, and M. Jäntii (New York: Russell Sage Foundation, 2011).

[5]The home learning environment measure takes into account the amount of educational materials such as books or toys that are in the home; parent time spent using those materials with children, and time spent taking children to other environments such as libraries.

[6]F. F. Furstenberg, "The Challenges of Finding Causal Links between Family Educational Practices and Schooling Outcomes," in *Whither Opportunity: Rising Inequality, Schools, and Children's Life Chances*, eds. G. J. Duncan and R. J. Murnane (New York: Russell Sage Foundation, 2011).

[7]S. E. Mayer, A. Kalil, P. Oreopoulos, S. Gallegos, "Using Behavioral Insights to Increase Parental Engagement: The Parents and Children Together (PACT) Intervention," NBER Working Paper No. 21602, National Bureau of Economic Research (October 2015).

Does increased income reduce child maltreatment?

Lawrence M. Berger

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Child maltreatment and child protective services (CPS) involvement are relatively common experiences; about 4.5 percent of children in the United States (6 million) are the subject of calls to CPS each year, and about 1 percent of all children have confirmed instances of child maltreatment annually. Over the course of childhood, about 13 percent of all children, and 21 percent of African American children, will have a confirmed child maltreatment report. Maltreatment is also an expensive public health problem; the federal government spends about $8 billion annually on the child protective services system, and the annual cost of new incidents in the United States is estimated to be between $1.25 billion and $5.5 billion.[1] Child maltreatment is correlated with a variety of adverse outcomes throughout the life course, including intergenerational transmission of both child maltreatment and overall disadvantage. In this article, I describe a study that used evidence from the Earned Income Tax Credit (EITC) to assess whether increasing income for low-income families reduces the incidence of child maltreatment.[2]

Child maltreatment and income

There is an extensive literature linking child maltreatment to low-income status. However, most prior studies had data or methodological limitations, and there is thus little evidence to indicate whether low-income status is a causal factor in child maltreatment. Child maltreatment studies often do not use population-based samples, making it difficult to generalize beyond a select group. From past work, we also have a limited understanding of the potential mechanisms that could explain a causal link. Higher income may mechanically lower a family's likelihood of maltreatment, particularly child neglect, by increasing the resources available to provide for all of a child's needs. Increased income could also result in better maternal and child health and decreased parental stress and depression, thus reducing parental behaviors that could lead to neglect or abuse.

There is a question about bias in these data; are low-income children just more likely to be picked up by the system, but not more likely to actually experience maltreatment? Based on current evidence, it appears that while this might happen to some extent, bias does not explain the majority of the connection between income and child maltreatment. Finally, there is a question about selection; are families that are low-income at higher risk of child maltreatment because of other factors that are driving both characteristics?

The best evidence to date on the relationship between child maltreatment and income comes from two studies. First, David Fein and Wang Lee, using data from Delaware's randomized welfare reform experiment, found that assignment to a less generous, Temporary Assistance for Needy Families or TANF-like welfare program was associated with lower income and increased CPS involvement, particularly for child neglect, relative to assignment to the more generous Aid to Families with Dependent Children or AFDC-like program.[3] More recently, Maria Cancian, Mi-Youn Yang, and Kristen Slack, using data from a randomized control trial, found that an increase in the amount of child support received by welfare recipients led to reduced CPS involvement.[4] While these results are suggestive, they do not definitively establish a causal relationship between income and child maltreatment.

The Earned Income Tax Credit

The EITC is a refundable federal tax credit designed for low-wage workers. The amount of the credit is based on earnings, and varies by marital status and number of children. In 2012, the amount of the credit ranged from just under $500 to nearly $6,000.[5] In addition to the federal credit, 24 states provide a supplement, usually calculated as some proportion of the federal amount. The EITC is a major component of the U.S. safety net; the gradual phase-in and phase-out structure provides a work incentive that lifts many families out of poverty. A growing literature links the EITC to health and well-being, with the largest effects found for single-mother and larger families (who also receive the largest benefits from the EITC). The study described in this article, conducted by myself, Sarah Font, Kristen Slack, and Jane Waldfogel, extends this body of research by using data from the Fragile Families and Child Well-Being Study to estimate causal effects of income on child maltreatment among unmarried families. We made use of variation between states and over time in the generosity of the total federal and state EITC potentially available to a family to examine whether differences in family income that resulted only from differences in EITC policy affected families' incidence of child maltreatment.

Effects of higher EITC on child maltreatment

We examined three outcome measures: child abuse, child neglect, and CPS involvement. The first two measures were behaviorally approximated using mothers' responses to questions related to the frequency of physical violence and

emotional aggression (for child abuse) and about parental actions or inactions that placed a child at risk of harm (for child neglect), the third was mothers' self-reports of whether they had been investigated by CPS.

Using an instrumental variable approach, we found that an increase in EITC income is associated with reductions in behaviorally approximated child neglect and CPS involvement (but not behaviorally approximated child abuse), particularly among low-income single-mother families in which the mother was not cohabiting with a romantic partner. The results for single-mother families suggest statistically significant small to moderate decreases in behaviorally approximated neglect of 3 to 4 percent for a $1,000 increase in income, and modestly large decreases in reported CPS involvement of 8 to 10 percent for the same income increase. These results are generally robust to different sample definitions and alternative outcome measures.

Policy implications

In addition to being disproportionately low-income, families at risk of maltreatment are likely to be characterized by a variety of other risk factors, including domestic violence, substance abuse, and mental health. These other factors are difficult to ameliorate, and treatment, if available, is often prolonged and expensive, and take-up and compliance are low. If there is indeed a causal link between income and maltreatment, then economic support may be an additional tool for preventing child maltreatment. It may be easier, faster, and more efficient to increase income than to provide and deliver longer-term services to address other issues, particularly if those services are of questionable efficacy. Additional research should seek a more complete understanding of whether the links between income and child maltreatment are indeed causal, and the extent to which economic support policies could reduce child maltreatment and CPS involvement.■

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[1]X. Fang, D. S. Brown, C. S. Florence, and J. A. Mercy, "The Economic Burden of Child Maltreatment in the United States and Implications for Prevention," *Child Abuse & Neglect* 36, No. 2 (2012): 156–165.

[2]The study is described at greater length in L. M. Berger, S. A. Font, K. S. Slack, and J. Waldfogel, "Income and Child Maltreatment in Unmarried Families: Evidence from the Earned Income Tax Credit," *Review of Economics of the Household* (2016): 1–28. doi:10.1007/s11150-016-9346-9

[3]D. J. Fein and W. S. Lee, "The Impacts of Welfare Reform on Child Maltreatment in Delaware," *Children and Youth Services Review* 25, No. 1–2 (2003): 83–111.

[4]M. Cancian, M.-Y. Yang, and K. S. Slack, "The Effect of Additional Child Support Income on the Risk of Child Maltreatment," *Social Service Review* 87, No. 3 (September 2013): 417–437.

[5]Center on Budget and Policy Priorities, Analysis of the Census Bureau's March 2012 Current Population Survey, Washington, DC: 2013.

Promoting school readiness through parental engagement

Helena Duch

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Poverty tends to be associated with myriad risk factors, including single parenthood, low maternal education, residential mobility, substance abuse, and lack of social support. The effect of these risk factors on child cognitive outcomes may be mitigated by positive parenting behaviors, suggesting that parenting is a key area for social policy around school readiness.[1] While preschool programs can certainly have a large effect on school readiness, programs that target parents as well as teachers have the potential to achieve better school readiness outcomes than either type of intervention alone. Few current programs focus on the home and school environments with equal emphasis. This article presents evidence from two programs for low-income families that are designed to promote school readiness through parental engagement.

The Getting Ready for School program

There are a set of cognitive, social, and emotional skills that are necessary for children to enter school ready to learn. These school-readiness skills create the foundation for academic success, physical and mental health, and general well-being. As Ariel Kalil pointed out in her article, socioeconomic disadvantage often leads to large gaps in the development of school-readiness skills. Kimberly Noble and I are the principal investigators of an evaluation of the Getting Ready for School program, which aims to promote three factors of school readiness: literacy, math, and self-regulation (executive functioning and emotional regulation), and to help close these gaps.

In this article, I will focus on the parent component, which evolved over the course of program development. In the first year of the program, parents were given a book of skill-building activities that they could easily do with children. There was also a series of accompanying workshops for parents who wanted to learn more about how to implement the activities. While this intervention was successful to some extent, parent uptake was low. In the second year of the program, many new items were added to give parents alternative ways to engage with the program. In selecting additional elements, we looked for those that would be scalable and easy for any preschool center to implement.

One item added to the parent component in the second year was a weekly letter from the teacher to the parents listing three things that were being worked on with their child during that week, and identifying specific items from the activity book they could do at home that would support the classroom work. We also created a website that included all activities in the book in video format, to make it easier for low-literacy parents and visual learners to participate. Since most families did not have easy computer access, the website was available on tablets that parents could check out and take home as needed. Finally, we added "getting ready for school parties" held at pick-up times, which provided activities for parents and children to do together, and offered participation incentives such as prize raffles and food.

Parent participation did improve after these changes; in the second year, parent participation in at least one activity increased from 54 to 68 percent, and the average family participation rate over all activities increased from 13 to 20 percent. Even with this improvement, participation continued to be uneven across activities, and some families were consistently more likely to participate than others. We found no differences between the three groups by language, ethnicity, education, income-to-needs ratio, or father presence. However, those with relatively high participation rates (over 25 percent) were more likely to be full-time workers, and less likely to receive food stamps.

How important is parent participation?

Preliminary data indicate that higher parental participation is indeed associated with better child outcomes, specifically picture vocabulary, phonological awareness, social competence, and emergent reading and writing skills.[2] However, parent participation was not found to be associated with measures of math or child self-regulation skills. Note that these results reflect only one year of follow-up; further results with longer follow-up and a larger sample size are forthcoming. Even with these preliminary results, it is encouraging to see that participation does matter, but discouraging that participation rates remained fairly low. It is also unclear with these data what parents are doing outside the program to promote school readiness, since that was not tracked.

Increasing participation and engagement

Working with Lisa Gennetian, and building on our early results, we used principles of behavioral economics to target two primary behaviors: parent attendance at Get Ready for School kickoff sessions, and the amount of time spent on Get Ready for School activities outside the classroom. We looked for simple interventions that would make it easier for families to participate. For the kickoff sessions, half of the parents received paper invitations in an envelope with

personalized handwritten information; these invitations were followed by a text message reminder. To improve parent follow-through with activities outside the classroom, families in half of the classrooms received a tracking sheet and stickers that they could use to record activities. Text message reminders were also used for this purpose, and recognition was given to the best-performing classroom. Early results for these simple and inexpensive additional steps show both higher attendance at kickoff sessions and more time spent on activities outside the classroom.

A different approach

While it is promising to see positive results from relatively simple and low-cost interventions, there may still be a place for more intensive and expensive programs aimed at promoting parenting skills. These programs could be targeted, rather than universal, and part of a multi-tiered approach that offers additional services to families who need them. An example of such an intervention is the CARING preschool program, a 12-week parent-child intervention aimed at improving children's social-emotional outcomes through helping parents learn how to support creative expressive play at home. CARING uses trained facilitators with a mental health background, and is considerably more expensive to run than the Getting Ready for School program. The CARING intervention is being evaluated with a randomized control study in two Head Start sites in New York City. Preliminary outcomes show significant but small positive effects on a number of outcomes including maternal sensitivity and cognitive stimulation of the child during play.

Next steps

Research on promoting school readiness through parental engagement is ongoing, and a number of questions remain. Even with all the behavioral strategies we are using in the Getting Ready for School program, we still have relatively low parent participation. We have conducted focus groups and done qualitative work, and are still seeking creative strategies to better reach the low participators. Our intervention is very balanced between math, literacy, and self-regulation, but we found the largest effect on literacy; it would be useful to learn more about parent-child interactions at home so that we are better able to tailor the program to achieve comparable gains in the other two areas. A survey of families in our study revealed that 77 percent accessed Facebook on a daily basis, suggesting that more work could be done to explore the role that social media could play in parental engagement. Finally, more work could be done to explore whether and how community-level multi-tiered interventions, using universally applied low-cost interventions (such as Getting Ready for School), could be combined with targeted intensive interventions (such as CARING) to effectively engage parents in vulnerable populations.■

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[1]N. J. Cabrera, J. Fagan, V. Wight, and C. Schadler, "Influence of Mother, Father, and Child Risk on Parenting and Children's Cognitive and Social Behaviors," *Child Development* 82, No. 6 (November/December 2011): 1985–2005.

[2]Picture vocabulary and phonological awareness were assessed with tests; social competence and emergent reading and writing scores were based on teacher reports.

Poverty and K–12 schooling

Four panelists spoke on the topic of poverty and K–12 schooling. George Farkas gave an overview of K–12 interventions and their effect on achievement gaps, finding the most promise in the "no excuses" school model and in one-to-one tutoring during the school day. Rucker Johnson looked at the interactive effects of Head Start and K–12 spending, arguing that for children from low-income families, additional Head Start spending has a much greater effect on outcomes such as high school graduation when K–12 spending is high, compared to when it is low. Chloe Gibbs discussed the effects of full-day compared to half-day kindergarten, and finds that the longer day does have a large, positive effect on literacy skills. Finally, Jennifer Jennings described a study examining high school choice for eighth graders in New York City, concluding that a policy ostensibly intended to inform students and ensure that they choose the school that is the best fit for them actually acts as a barrier to students from disadvantaged families. This set of articles summarizes their presentations.

K–12 programs to reduce the intergenerational transmission of poverty

George Farkas

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Children from the lowest income quintile begin kindergarten more than one standard deviation lower in both reading and math skills than children in the top quintile.[1] They are also below children in the top quintile in academic work habits, and above them in antisocial behavior. These gaps persist, and may increase, as students move through their schooling careers. This article reviews past and present programs intended to reduce these achievement gaps, and identifies promising avenues to be explored in the future.

Preschool and kindergarten programs

Children who begin kindergarten behind their peers face a difficult battle trying to catch up and ongoing efforts aimed at closing these gaps prior to the start of schooling have had mixed results.

The Head Start program began in 1965 using a "whole child" model to provide comprehensive services to children and families, including preschool education, health care, and parental support. An evaluation of the program in 2002 found small positive effects that did not continue after children entered kindergarten.[2] One explanation for the small differences detected between those in the Head Start treatment group and those in the control group is that there were more opportunities for quality preschool education for the target Head Start population than there were when the program began, so many in the control group also obtained early education during the study period. There have also been criticisms of the Head Start curricula.

Some state pre-kindergarten programs have shown promise, while others have not.[3] The Boston Pre-K program, which used very high-quality curricula, showed significant positive effects at the beginning of kindergarten, but the long-term effects of the intervention are unknown.

Full-day kindergarten programs have been shown to be effective, but about 70 percent of children are already participating in such programs, so there is limited room for expansion.[4] Transitional kindergarten, an extra year of kindergarten before beginning first grade, has been found to be effective for certain students and should be part of the solution for children who appear likely to benefit from it. This, too, already exists widely.[5]

There appears to be an issue with alignment between pre-kindergarten and subsequent year curricula, which suggests that teachers need to be able to provide instruction that complements the pre-kindergarten boost for those who received it. For this reason, pre-kindergarten programs should either be universal so that instruction in kindergarten and beyond can take advantage of pre-kindergarten gains, or elementary school teachers should receive additional training to provide differential instruction depending on a child's starting point.

Narrowing achievement gaps at school entry is important, and there are existing curricula that can do this, but they are not widely used. In particular, curricula for the largest preschool program, Head Start, need to be significantly improved or replaced. Because even programs that achieve large positive effects prior to school entry are likely to have those effects fade out in later years, it is likely that effective interventions need to be multi-year, and include a mechanism to help students who fall behind in later years to catch up.

Interventions beyond kindergarten

I reviewed results for a number of different approaches to narrowing achievement gaps in first grade and beyond that appear unlikely to be a large part of the solution. These

include instructional innovations, social and emotional learning programs, summer instruction, No Child Left Behind accountability, after-school tutoring, and whole-school reform. However, I did identify several interventions that appear to hold promise for closing achievement gaps, including tutoring during the school day, small schools, and "no excuses" schools. These approaches are discussed below.

Intensive tutoring during the school day

Several studies have shown positive results from intensive and extensive, structured, very small group tutoring during the school day. These results have been found for both reading and math interventions.[6] Evaluations of one company that provides tutoring services, SAGA, have shown positive results in Houston and Chicago.[7] The cost of this intervention is $3,800 per participant, but could be brought down to $2,500 if delivered at scale. Tutoring is provided by paraprofessionals (rather than teachers), using a 2-to-1 student-tutor ratio. Such tutoring during the school day, every day, for a total of around 150 hours per school year, could play a significant role in narrowing achievement gaps among students at all grade levels. If this intervention is provided continuously through all grade levels for those who need it, it could eliminate the fade-out problem that one-time interventions have had.

Small schools

One study found that small high schools of choice increased graduation rates for disadvantaged students in New York City by 9.5 percentage points, which closes half of the black-white graduation gap, without increasing annual school operating costs.[8] These gains in graduation rates were achieved without significantly raising test scores, which suggests that more work needs to be done in examining how interim measures of academic achievement relate to long-term outcomes.

"No excuses" schools

"No excuses" charter schools follow a model of high expectations, with all students following a college preparatory curriculum. They have strict behavioral and disciplinary codes, and spend more time on academics, with longer school days and extended school years. These schools enroll a very high percentage of low-income and minority students, and have an intense focus on reducing achievement gaps, with tutoring during the school day provided to students who fall behind their peers.

A review of experimental studies of "no excuses" schools found that among students who applied, those who were randomly chosen to attend gain 0.25 of a standard deviation on math scores and 0.16 of a standard deviation on literacy scores as a result of attending for one year.[9] If such gains continued each year as students moved up the grades, these schools could be very effective at closing achievement gaps.

One example of a "no excuses" charter school is the Knowledge is Power Program (KIPP), a nonprofit network of 200 public charter schools. Evaluations of KIPP have shown significant positive effects. Although the sustainability and scalability of this strategy is yet to be determined, the intervention appears to me to be the most promising of all available options, and I suggest that the attributes of KIPP schools be implemented as widely as possible in schools serving low-income students.

Other than program evaluation, what research would be most useful?

Beyond evaluating particular interventions, it is essential that research be done on program effect fade-out and how to prevent it. This means understanding achievement growth trajectories (examining course grades as well as test scores) and how they are related to details of instruction at each grade level. It also means understanding how and why later important outcomes such as high school graduation or college entrance are related to trajectories of test scores, course grades, and other variables.■

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[1]G. J. Duncan and K. Magnuson, "Investing in Preschool Programs," *The Journal of Economic Perspectives* 27, No. 2 (Spring 2013): 109–132.

[2]M. Puma, S. Bell, R. Cook, C. Heid, P. Broene, F. Jenkins, A. Mashburn, and J. Downer, "Third Grade Follow-Up to the Head Start Impact Study: Final Report," OPRE Report 2012–45, Office of Planning, Research and Evaluation, U.S. Department of Health and Human Services, October 2012. https://www.acf.hhs.gov/sites/default/files/opre/head_start_report.pdf

[3]See, for example, W. T. Gormley, Jr., T. Gayer, D. Phillips, and B. Dawson, "The Effects of Universal Pre-K on Cognitive Development," *Developmental Psychology* 41, No. 6 (2005): 872–884; and M. W. Lipsey, D. C. Farran, and K. G. Hofer, *A Randomized Control Trial of a Statewide Voluntary Prekindergarten Program on Children's Skills and Behaviors through Third Grade*, Peabody Research Institute, September 2015.

[4]For full-day kindergarten outcomes, see C. R. Gibbs, "Experimental Evidence on Early Intervention: The Impact of Full-day Kindergarten," Working Paper, Batten School of Leadership and Public Policy, University of Virginia, No. 34, 2014; For proportion of children enrolled in full-day kindergarten, see *Early Childhood Longitudinal Study, Kindergarten Class of 2010–2011*, National Center for Education Statistics. https://nces.ed.gov/ecls/kindergarten2011.asp

[5]H. Quick, K. Manship, A. Holod, N. Mills, B. Ogut, J. J. Chernoff, J. Anthony, A. Hauser, S. Keuter, J. Blum, and R. González, *Impact of California's Transitional Kindergarten Program, 2013–14*, American Institutes for Research, December 1, 2015.

[6]For reading, see B. A. Wasik and R. E. Slavin, "Preventing Early Reading Failure with One-To-One Tutoring: A Review of Five Programs," *Reading Research Quarterly* 28, No. 2 (1993): 178–200; for Math, see P. J. Cook, "Not Too Late: Improving Academic Outcomes for Disadvantaged Youth," Working Paper WP-15-01, Institute for Policy Research, Northwestern University, February 2015.

[7]For Houston, see R. G. Fryer, Jr., "Injecting Charter School Best Practices into Traditional Public Schools: Evidence from Field Experiments," *Quarterly Journal of Economics* 129, No. 3 (2014): 1355–1407; for Chicago, see R. Ander, J. Guryan, and J. Ludwig, "Improving Academic Outcomes for Disadvantaged Students: Scaling Up Individualized Tutorials," Policy Proposal 2016-12, The Brookings Institution, March 2016. https://www.brookings.edu/research/improving-academic-outcomes-for-disadvantaged-students-scaling-up-individualized-tutorials/

[8]H. S. Bloom and R. Unterman, "Can Small High Schools of Choice Improve Educational Prospects for Disadvantaged Students?" *Journal of Policy Analysis and Management* 33, No. 2 (2014): 290–319.

[9]A. Cheng, C. Hitt, B. Kisida, and J. N. Mills, "'No Excuses' Charter Schools: A Meta-Analysis of the Experimental Evidence on Student Achievement," *Journal of School Choice* 11, No. 2 (2017): 209–238.

Interactive effects of Head Start and K–12 spending

Rucker C. Johnson

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Breaking the cycle of poverty may require early investment in disadvantaged children's skills, followed by sustained investments over time. Without these subsequent investments, the effects of early interventions may disappear. In turn, early skills development may make later interventions more successful. The study discussed in this article, conducted by myself and C. Kirabo Jackson, explored whether such complementarity between early and later childhood investment exists.[1] We looked at whether early childhood investments for disadvantaged children that were followed by increases in public school expenditures were particularly effective at improving children's long-term educational and economic outcomes.

Changes in Head Start and public education funding

In order to evaluate complementarity between early and later investment, we use two policy changes that affected investment in children. The first policy change concerned the Head Start program, which was established in 1965 to increase access to early childhood education and pediatric care for low-income children. Head Start was rolled out incrementally, so there was significant variation over time and location in the amount of spending per pupil, and in what services were available to participants. This variation makes it possible to isolate the effects of Head Start spending. Spending increases can affect: (1) who and how many children enroll in these programs; (2) the quality of pre-kindergarten instruction; and (3) spillover effects on non-Head Start participants in the community.

The second policy change is court-ordered school finance reforms. Until the early 1970s, the majority of public school spending was funded through local property taxes, which meant less affluent neighborhoods tended to have lower per-pupil K–12 spending than more affluent neighborhoods. School finance reforms changed how public school spending levels are determined, reducing inequality in school spending. Again, variation in time and location in these finance reforms makes it possible to isolate the effects of public school spending levels.

Both of these policies had a dramatic effect on funding for education in the United States. We explore the combined effects of the two policies, making use of variation over time and location in spending levels in order to isolate their effects.

We used data from the Panel Study of Income Dynamics on those born between 1950 and 1976 and followed the sample through 2013. Although test scores are often used as outcome measures in evaluating child interventions, evidence suggests that such measures may miss effects on long-run outcomes.[2] Therefore, we looked at a variety of adult outcomes including educational attainment, earnings, poverty, and incarceration.

Evidence of complementarity between early and later childhood investment

An example of our analysis can be seen in Figure 1. The left panel of this figure shows the estimated interaction effects of Head Start spending by the percentile of K–12 spending on the likelihood of graduating from high school. If there is indeed complementarity between the two types of spending, then the plots will be upward sloping. We do see such a pattern. The nearly flat line for nonpoor children indicates that additional spending on Head Start has negligible direct or indirect effects on that population, at any level of K–12 spending. For children from low-income families in public school districts below the 30th percentile of K–12 spending, additional Head Start spending has only small and statistically insignificant effects. In contrast, at the 90th percentile of K–12 spending, an additional $1,000 of Head Start spending per poor four-year-old increases the likelihood of high school graduation by about 6.5 percentage points.

The right panel of Figure 1 shows the marginal effects of increases in K–12 spending across the range of Head Start spending. As expected, for nonpoor children, increased K–12 spending increases graduation rates with no additional effect from increased Head Start spending. For poor children, however, a 10 percent increase in K–12 spending increases high school graduation rates by about 2 percentage points at the 5th percentile of the Head Start spending distribution, and by about 12 percentage points at the 90th percentile.

Similarly, we found evidence of complementarity between Head Start and public K–12 spending for adult outcomes, including years of completed education, adult wages, adult poverty, and the likelihood of incarceration. These findings suggest that increases in per-pupil spending as a result of school finance reform led to improved adult outcomes for those who were exposed to Head Start as preschoolers. These effects are restricted to children from low-income families, and are found only for changes in spending experienced during children's school-age years. Larger spending increases led to larger effects, as did more school-age years of exposure. We find that the effects of a 20 percent increase in school spending are large enough to

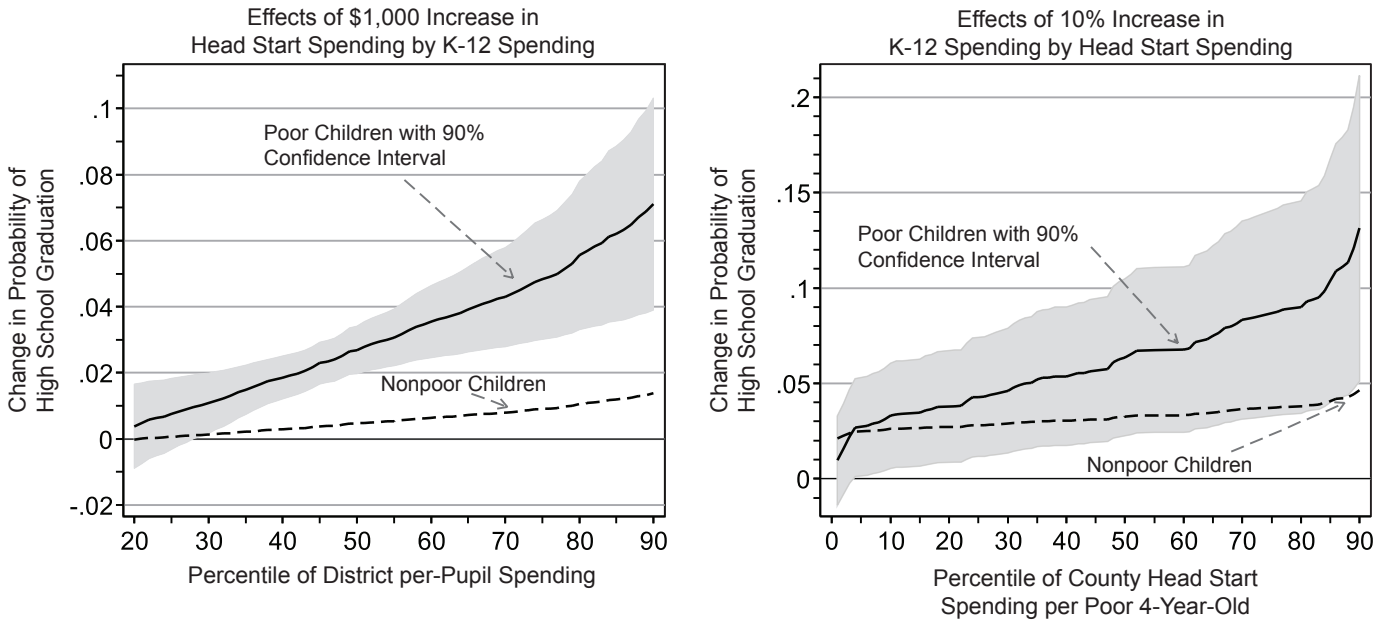

Figure 1. Interaction effects of Head Start and K–12 spending on high school graduation.

reduce outcome gaps between children from poor and non-poor families by at least two-thirds. A 1 percent increase in per-pupil spending increases adult wages for children from poor families by 1 percent. These findings suggest that sustained investment throughout disadvantaged children's development is necessary to narrow long-term disparities in well-being.■

[1]Our study is discussed in more detail at R. C. Johnson and C. K. Jackson, "Reducing Inequality Through Dynamic Complementarity: Evidence from Head Start and Public School Spending," NBER working paper No. 23489, National Bureau of Economic Research, June 2017.

[2]See, for example, J. Heckman, R. Pinto, and P. Savelyev, "Understanding the Mechanisms Through Which an Influential Early Childhood Program Boosted Adult Outcomes," *The American Economic Review* 103, No. 6 (October 2013): 2052–2086.

Does full-day kindergarten reduce achievement gaps?

Chloe Gibbs

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As discussed earlier in this issue, academic achievement gaps by family income emerge early and persist. One approach to remediating these gaps is to expand kindergarten instruction from half-day to full-day. This article presents findings from a study that explored whether students in full-day kindergarten programs outperformed their half-day kindergarten peers in literacy skills by the end of the kindergarten year. I consider whether recent expansions in full-day kindergarten were wise or whether resources currently spent on those programs could be better used on other early investments.

How could full-day kindergarten help close gaps?

Past work has noted the importance of early skill development for future outcomes.[1] Other research has identified long-term effects of interventions in early childhood and primary grades.[2] This evidence suggests that kindergarten, as the gateway to formal schooling, could be an appropriate place for interventions aimed at closing the achievement gap. However, work on brain development, and emerging evidence that the brain's adaptability declines as a child ages, suggests that kindergarten interventions might be less effective than those applied at an earlier age.

As Figure 1 shows, while provision of full-day kindergarten has expanded dramatically—about three-quarters of kindergarten students in the United States have access to a full-day program—policymakers are considering further expansion. Importantly, this rise of full-day kindergarten has occurred largely in the absence of rigorous evidence about its effectiveness.

There are a number of possible mechanisms through which full-day kindergarten could help close achievement gaps, though I will not be able to disentangle them in the study discussed here. The first is increased instructional time, which we expect might directly improve educational outcomes. There are also other features of the increased time in school provided by full-day, as opposed to half-day, kindergarten that might be important, including crowding out what children might otherwise do during that time (which may or may not include educationally enriching activities). It is also effectively a childcare subsidy, which increases family resources and could allow parents to obtain employment or expand their working hours. Finally,

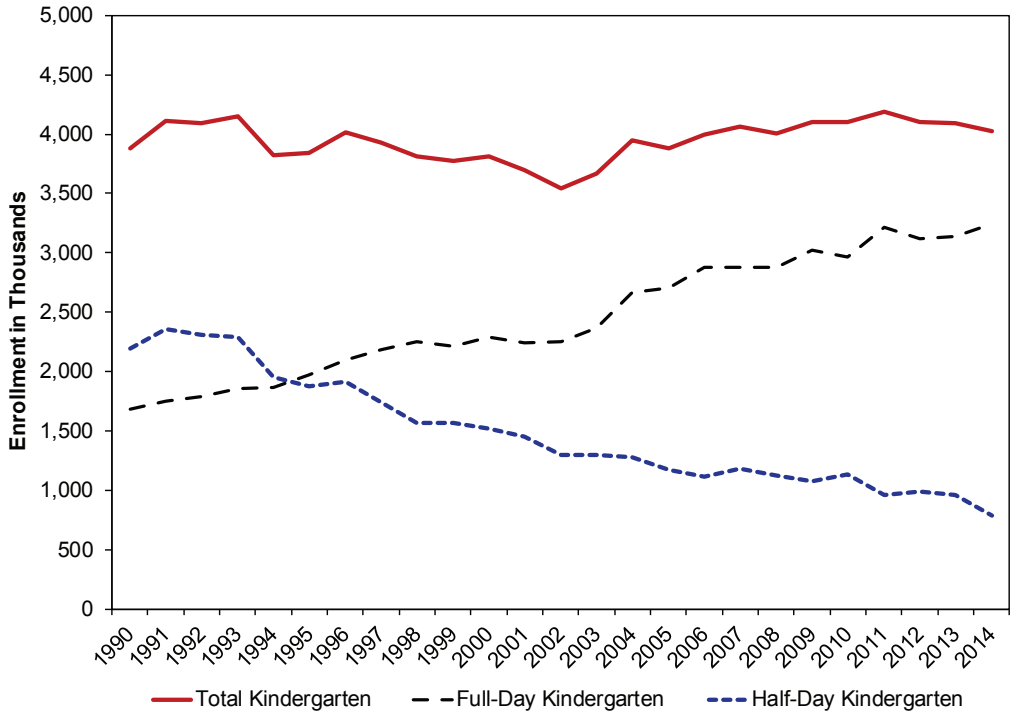

Figure 1. Kindergarten enrollment in thousands, 1990–2014.
Source: U.S. Department of Commerce, Bureau of the Census, CPS October school enrollment supplement.

children who attend full-day kindergarten may benefit from other aspects of the longer school day that are important for cognitive development, including additional snacks or meals at school and nap time.

Policy landscape

Much of the action around full-day kindergarten is occurring at the state and local levels. Currently, 10 states and the District of Columbia provide full-day kindergarten at no charge to all children per state statute.[3] Kindergarten attendance is mandatory in only 16 states; seven of the 10 states requiring full-day kindergarten provision also mandate kindergarten attendance. Only 24 states specify a funding formula that funds full-day kindergarten at or above the level of first grade; in the remaining states, there is a financial disincentive to provide full-day kindergarten.[4]

The kindergarten experience

In work with Daphna Bassok and Scott Latham, we illustrate how the kindergarten experience changed between 1998 and 2010. Over that time period, the proportion of kindergarten students attending a full-day program rose dramatically, from about 55 percent to around 80 percent. The proportion attending kindergarten in a building that also housed a pre-kindergarten program also increased, from below 40 percent to over 50 percent. Over the same time period, there was little change in class size or in whether a student's peers had attended preschool. Black children have been consistently more likely than white or Hispanic children across this time period to be attending a full-day program, and nearly all black kindergarten students are now in full-day kindergarten. In general, entire school districts decide whether to provide full-day kindergarten to all students, and those in low-income areas or with lower-performing schools are more likely to do so.

Effect of full-day kindergarten expansions on academic achievement

In 2007, the Indiana General Assembly passed legislation to increase funding for greater access to and availability of full-day kindergarten in the state. Beginning in the 2007–2008 school year, school districts and charter schools were eligible to receive a full-day kindergarten grant from the state that provided a per-pupil allocation for kindergarten students in the district. My study makes use of this policy change to explore the causal effect of full-day kindergarten on early literacy skills, as measured by standardized assessment scores.

Figure 2 shows the impact of full-day kindergarten on end-of-kindergarten literacy skills. The effect size for all children was approximately 0.3 standard deviations, with Hispanic children experiencing particularly large gains. It is probable that the pronounced effects on Hispanic students are at least in part due to English language learning, though I cannot confirm this with the data I have. Figure 3 shows that there were also dramatic differences in achievement gaps at the end of the year for those attending full-day programs

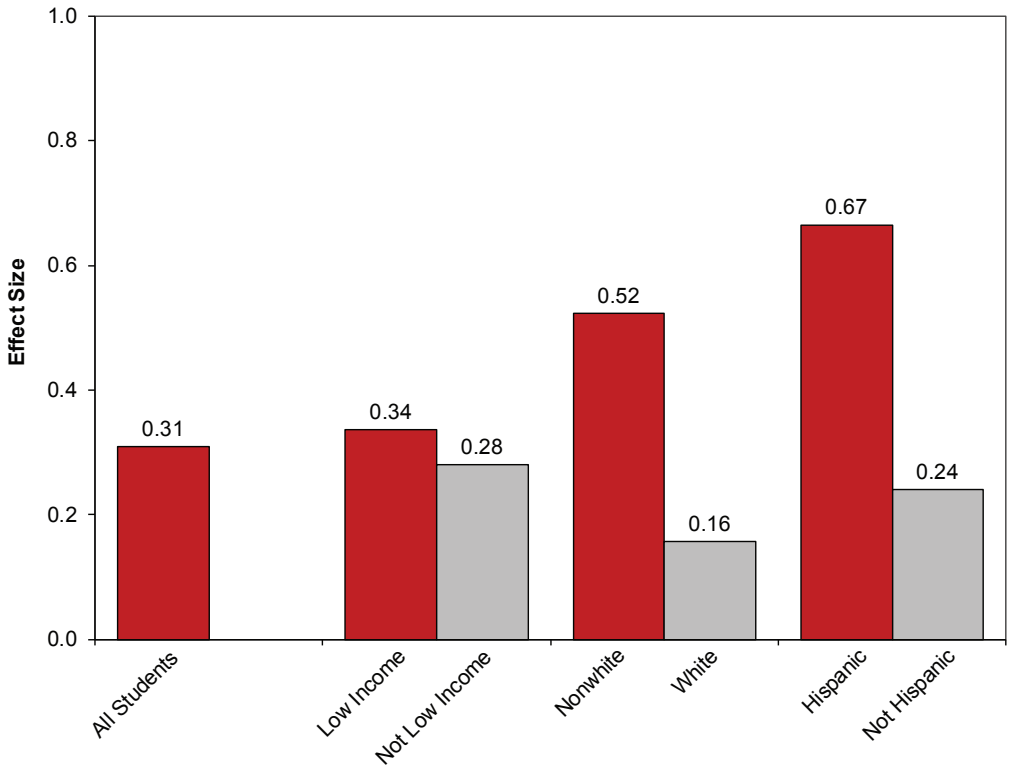

Figure 2. Literacy gains attributable to full-day kindergarten.

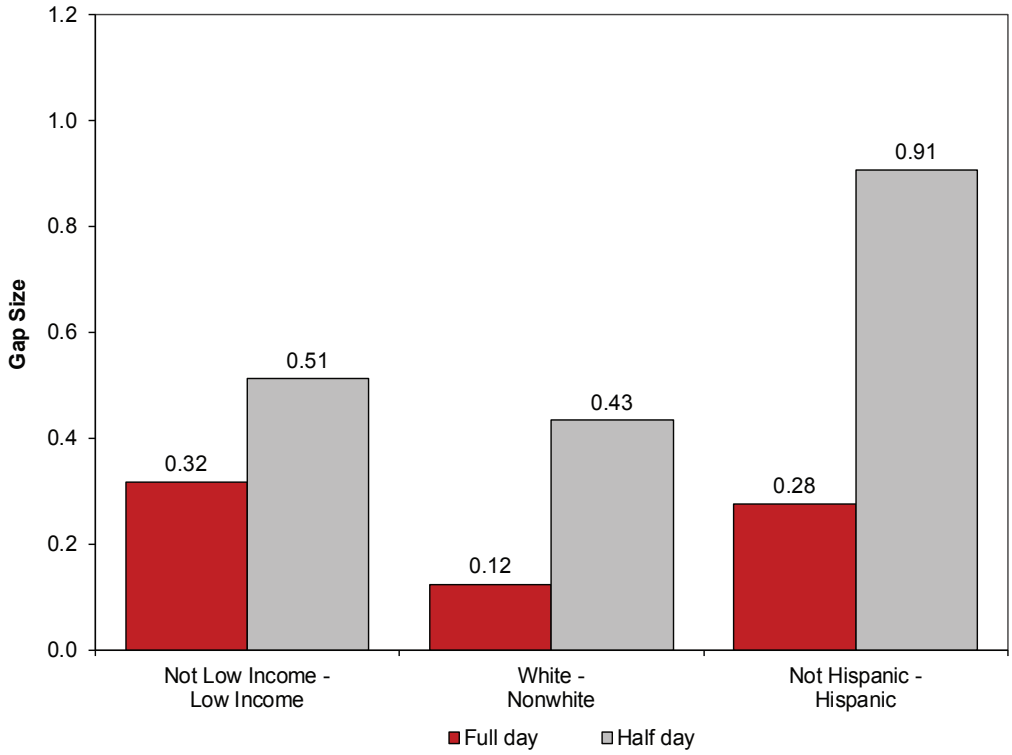

Figure 3. End-of-kindergarten achievement gaps in literacy skills.

compared to half-day programs; in particular, full-day kindergarten largely closes the gap in literacy skills between Hispanic and non-Hispanic students.

Rough estimates of cost-effectiveness suggest that full-day kindergarten generates an effect on early literacy skills of between 0.07 and 0.21 standard deviations per thousand dollars of spending. Notably, this is a higher return on investment for this particular outcome than has been found for either class-size reduction or Head Start.

Overall, I found that full-day kindergarten has a large, positive effect on literacy skills assessed at the end of kindergarten, skills that are associated with subsequent educational and labor market success. I also found differential effects for subgroups that may have implications for closing achievement gaps early in formal schooling; Hispanic students in full-day kindergarten had particularly large gains relative to their half-day kindergarten peers. This finding might also suggest that it would be effective to target full-day kindergarten to particular areas or students rather than use it universally; however, in other work I have found a strong peer effect, with the presence of above average students in the class resulting in larger gains for lower-performing students. In this setting, students received full-day kindergarten with a mixed ability peer group. Thus, I suggest caution in interpreting these findings as an endorsement of targeted programming. Finally, although full-day kindergarten has increased dramatically over time, it remains a discretionary item that states and school districts are often considering in the context of the many ways to spend limited funds on early childhood education. Evidence about the effects of various early investments should be an important part of those deliberations.■

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[1]See, for example, G. J. Duncan, C. J. Dowsett, A. Claessens, K. Magnuson, A. C. Huston, P. Klebanov, L. Pagani, L. Feinstein, M. Engel, J. Brooks-Gunn, H. Sexton, K. Duckworth, and C. Japel, "School Readiness and Later Achievement," *Developmental Psychology* 43, No. 6 (November, 2007): 1428–1446.

[2]R. Chetty, J. N. Friedman, N. Hilger, E. Saez, D. W. Schanzenbach, and D. Yagan, "How Does Your Kindergarten Classroom Affect Your Earnings? Evidence from Project STAR," *The Quarterly Journal of Economics* 126, No. 4 (2011): 1593–1660.

[3]These are: Alabama, Arkansas, Delaware, Louisiana, Maryland, Mississippi, New Mexico, North Carolina, South Carolina, Washington DC, and West Virginia.

[4]Education Commission of the States (ECS), "50-State Comparison: State Kindergarten Policies," March 1, 2014, accessed June 10, 2016, at https://www.ecs.org/kindergarten-policies/.

Administrative complexity as a barrier to school choice

Jennifer Jennings

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Many school districts are now offering public school choice programs, where students rank schools in their district, and placement is determined by lottery. Multiple studies have found large positive effects of winning public school choice lotteries on longer-run outcomes, indicating that this strategy could potentially improve the outcomes of low-income students. However, my colleagues and I have found that disadvantaged students in New York City choose schools that are lower-performing than other schools that require comparable travel times from their home. This is partly because they are less likely to apply to higher-performing schools, and partly because even when they do apply, they often have limited access to crucial information and their strategies for navigating the process are less effective than those of their higher-income peers. In this article, I look at how administrative features of the New York City school choice system may constrain choices for lower-income students, and suggest some policy changes that may ameliorate this.

School effects, school choice, and inequality

For a long time, the conventional wisdom has been that schools play a very limited role in transmitting inequality across generations, accounting for only 8 to 17 percent of the variation in achievement by socioeconomic status.[1] However, more recent evidence has found large school effects on long-term outcomes, even where there were no short-term effects on test scores.[2] In this context, school choice becomes quite important.

School choice has expanded greatly in recent years, particularly in urban school districts. With colleagues Sean Corcoran, Sam Dinger, Carolyn Sattin-Bajaj, Sarah Cohodes, and Christy Baker-Smith, I am exploring whether family background limits access to higher-quality schools in New York City, and if so, how that could be changed.[3] In particular, we are looking at how administrative system complexity affects access for disadvantaged students.

High school choice and disadvantage in New York City

New York City has the largest district choice program in the country, with 769 programs available at over 437 schools. Every eighth grader is required to rank up to 12 programs, and a computer algorithm assigns each student to a school. The high school programs from which New York City eighth graders can choose vary in their admissions methods and priorities. In this study, we looked specifically at "limited unscreened" schools, which accounted for more than one-third of all New York City high school slots in the 2015–2016 school year. These schools are not academically selective, but many of them are high-performing; over one-quarter of them have graduation rates that exceed 80 percent. Over half of all schools in the Bronx with graduation rates above 80 percent are limited unscreened schools. (This group of schools also includes almost all the new small schools to which George Farkas refers in his article.)

While limited unscreened schools do not take academic achievement into account, they do give admission priority to students who attend an open house, information session, or school fair. In order to obtain priority status, students are required to sign in at these events, and each school is required to track and enter the names of these students into the application system.

New York City public high school students come from a diverse set of backgrounds, with about half of all families speaking a language other than English at home, and about 80 percent of students qualifying for free or reduced price lunch. There is also considerable diversity by ethnicity and race, with 40 percent of students Hispanic, 27 percent black, 16 percent Asian, and 15 percent white.[4] For our study, we used student-level administrative data, combined with data collected directly from individual schools on their open house dates, and interviews with school representatives at open houses on their admission process.

As expected, we found that information session priority increased the probability that a student was admitted to one of their preferred schools. Overall, there was a 77 percent chance of being admitted to a school with priority status, and a 29 percent chance without. Unsurprisingly, the extent to which information session priority affected admission varied greatly across schools; for schools in the top quartile by high school graduation rate, it was highly unlikely to be admitted without priority status. We found that students qualifying for free lunch, English language learners, and black and Hispanic students were much less likely than their peers to get session priority.[5]

Since higher graduation rate schools are in higher demand, and since session priority is particularly crucial to admission to these schools, one might reasonably expect that students would be more likely to get priority at schools with higher

graduation rates.[6] What we found, however, was that students are actually less likely to get priority status at high-performing schools. Again, disadvantaged students are even less likely than average to get priority status at these schools.

Barriers to access

There are a number of possible barriers to obtaining priority status, including lack of information or misleading information about open houses, and income and language-related barriers. As part of our study, we spoke to school representatives (often current students) at school fairs, and found that provided information on how to gain priority status did not always match up with published information, and different representatives from the same school often gave different information. For example, only 43 percent of school representatives reported that sign-in at a school fair was sufficient for priority without also attending an open house, although this should have been true in every case. Some representatives also cited other admission criteria, such as minimum grades, that were not in fact required.

We also found that information about open houses is very difficult to obtain. The dates and times of open houses are not widely publicized. In the year we studied, only about 20 percent of open houses were listed in a school directory, and nearly 20 percent of those changed after they were posted. Just over one-quarter of open houses were identified on the central Department of Education calendar. Many schools provided no open house details on their website beyond an instruction (in English only) directing people to contact the school for more information; this may represent a particular hurdle for non-English speaking families.

Reducing income and racial disparities in school access

While our study does not address the question of whether the information session policy improves student outcomes by placing students at their "best fit" schools, it is clear the policy acts as a barrier to some students, with consequences for access to higher-quality schools. The second phase of this study is a randomized controlled trial that, in part, aims to increase attendance at open houses and fairs. This intervention (1) gave students a 40-minute lesson about the process; (2) provided each participating student with a list of 30 schools with graduation rates above 70 percent that were within reasonable travel time of their home; and (3) gave parents and students the opportunity to opt-in to receive text message reminders about upcoming open houses. Results of this trial are still forthcoming, but we are hopeful that it will help reduce income and racial disparities in access to high-performing schools.■

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[1]J. S. Coleman, Equality of Educational Opportunity. Ann Arbor, MI: Inter-university Consortium for Political and Social Research, 1966.

[2]See, for example, A. Abdulkadiroğlu, W. Hu, and P. A. Pathak, "Small High Schools and Student Achievement: Lottery-Based Evidence from New York City," NBER Working Paper No. 19576, National Bureau of Economic Research, October 2013.

[3]Our study is part of a larger project, a 170-school randomized control trial in New York City testing three informational interventions intended to help disadvantaged students to access high-performing high schools.

[4]New York City Department of Education, http://schools.nyc.gov/Accountability/data/default.htm.

[5]These income and racial disparities in information session priority did persist after controlling for multiple student characteristics.

[6]Since there is no limit on the number of students who can sign in, there should be no capacity constraint.

Poverty, neighborhood, and school setting

Three panelists addressed various aspects of how neighborhoods and schools affect poverty and inequality. First, Lincoln Quillian gave an overview of the relationship between neighborhood and poverty. Based on current evidence, he concludes that neighborhood matters more for low-income families than for higher-income ones, and more for children than for adults. These findings may indicate an opportunity to reduce poverty by changing housing assistance policy. Second, David Deming discussed the implications of school segregation for school outcomes and inequality. He concludes that while academic achievement gaps can be closed by improving school practice, schools can promote social norms such as tolerance and civic participation only through integrative student assignment policies. Finally, Stephen Raudenbush considered the question of whether schooling increases or decreases social inequality. He argues that the expansion of schooling promotes equality both by equalizing access and because disadvantaged children gain more from access, and that this equalizing effect is larger for younger children than for older children.

Neighborhood and the intergenerational transmission of poverty

Lincoln Quillian

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Research shows that poor neighborhoods are an important source of disadvantage for their residents. For children, growing up in a poor neighborhood is associated with reduced educational attainment and lowered adult earnings. For adults, residence in a poor neighborhood is associated with worse health and reduced happiness. Because poor neighborhoods are disproportionately populated by African Americans, Latinos, and low-income individuals, the effects of poor neighborhood environments tend to compound existing forms of individual disadvantage. Further, evidence suggests the effects of residence in a poor neighborhood are greater for children from low-income backgrounds. Neighborhood poverty is an especially important factor contributing to racial inequality and intergenerational poverty.

Who experiences neighborhood poverty?

Table 1 shows the average census tract poverty rate by annual household income and by individuals' race and ethnicity. Unsurprisingly, low-income individuals and families are more likely to experience neighborhood poverty than are those with higher income levels (although nationally, most poor people do not live in poor neighborhoods). But what *is* surprising is that Black and Hispanic families are far more likely than whites to live in poor neighborhoods, even after accounting for household income. The magnitude of the racial gap is striking: blacks and Hispanics with an annual household income exceeding $75,000 are more likely to live in poor neighborhoods than are whites with an annual household income under $40,000. Why is there such a large racial and ethnic gap in poverty contact? The gap results from the combination of a substantial racial gap in poverty rates combined with high levels of racial residential segregation. That is, because black and Hispanic poverty rates are two to three times white rates, racial segregation results in black and Hispanic households experiencing neighborhood poverty rates that are two to three times as high as those of white households. Income segregation within racial and ethnic groups, and income effects on living in neighborhoods with more whites, are not large enough to undercut this pattern.[1]

The high neighborhood poverty rates experienced by black, Hispanic, and low-income households directly reduce their life chances relative to whites in several ways: by contributing to racial disparities in exposure to crime and violence; by setting the stage for high poverty rates in schools attended by black and Hispanic students; and by subjecting black and Hispanic children to long-term "neighborhood effects" of growing up in poor environments.

Table 1
Average Census Tract Poverty Rate, 2005–2009

Annual Household Income	White	Black	Hispanic
Under $40,000	12.9	21.3	19.9
$40,000–$75,000	10.9	17.8	16.2
Above $75,000	8.9	13.9	13.3

Source: J. R. Logan. 2014. "Separate and Unequal: The Neighborhood Gap for Blacks, Hispanics and Asians in Metropolitan America." Report prepared for US2010 Project, July 2011. https://s4.ad.brown.edu/Projects/Diversity/Data/Report/report0727.pdf

What are the effects of living in a poor neighborhood?

In the 1987 book *The Truly Disadvantaged*, William Julius Wilson, suggested that there were "concentration effects" of neighborhood poverty, which produced a culture and a set of institutions and conditions that made it more difficult for residents of particular neighborhoods to escape poverty. Since the publication of this book, many researchers have worked to understand the effects of neighborhoods and how those effects might contribute to keeping one poor.

For the purposes of this summary, I focus on three excellent recent studies from the large "neighborhood effects" literature. In the first study, Geoffrey Wodtke, Felix Elwert, and David Harding looked at how exposure to disadvantaged neighborhoods during childhood compared to during adolescence affects high school graduation, and whether these effects vary across families of different socioeconomic status.[2] Using observational data from the Panel Study of Income Dynamics, they find that living in a disadvantaged neighborhood, particularly during adolescence, has a strong negative effect on the likelihood of high school graduation, and that this effect is larger for black children and for those from poor families.

The second study, the Moving to Opportunity (MTO) experiment, was a large random assignment experiment that looked at the effect of giving poor families housing vouchers that could be used only to move out of their very high-poverty neighborhoods to low-poverty neighborhoods. Although over a 10- to 15-year follow-up period, the experiment was found to have had no significant effect on economic self-sufficiency, researchers did find improvement in adult reports of well-being.[3] The change in the degree of happiness reported by adults who had the opportunity to move to a better neighborhood was very large—equivalent to the change in happiness associated with a $13,000 increase in individual income for this very low-income population.

In the third study, Raj Chetty, Nathaniel Hendren, and Lawrence Katz extended the Moving to Opportunity analysis using matched administrative data on adult economic outcomes and college attendance for MTO participants who were children at the time of the original experiment. Their analysis found that children whose family moved to a better neighborhood when they were young were more likely to attend college, and had higher earnings as adults, compared to those whose family stayed in poorer neighborhoods. Children whose family moved to a lower poverty neighborhood before age 13 (in the experimental group) had earnings in their mid-20s that were on average 30 percent higher than those who did not move.[4] The younger children were when the move took place, the larger the effect. By tracking MTO participants from childhood into adulthood, they found substantial effects where early MTO studies found none, but only for individuals who moved to less poor neighborhoods at early ages. Their results suggest substantial long-term effects of growing up in a poor neighborhood on later outcomes, with the strongest effects of neighborhood environment occurring at young ages.

Why do neighborhoods matter more for the disadvantaged?

Evidence suggests that neighborhoods matter more for low-income families than for higher-income families, and more for blacks than for whites. Higher-income people have more opportunity to "shop" for their residential environment, meaning they are better able to avoid or move away from neighborhoods that may have deleterious consequences for them. And when higher-income families live in or near poorer neighborhoods, they can spend private resources to make up for many of the problems of poor neighborhoods, for instance by putting their children into private schools. Low-income families are trapped in poorer neighborhoods first by financial constraints, but also by other factors including lack of knowledge of alternatives and a desire to reside near other family members.

Intergenerational transmission of neighborhood

As adults, people tend to live in neighborhoods with similar income levels to the neighborhood they grew up in. The intergenerational elasticity of average neighborhood (census tract) income is estimated to be about 0.64, meaning a 1 percent increase in parent's neighborhood income is associated with a 0.64 percent increase in the child's neighborhood income as an adult. This is a higher degree of intergenerational continuity than for individual income.[5] In many instances, successive generations of families from poor neighborhoods experience the disadvantage of a poor neighborhood environment.

The intergenerational transmission of neighborhood income level is much higher among persons who stay in the same general area they grew up in. This means that intergenerational persistence of low neighborhood income is especially common in metropolitan areas with high neighborhood poverty rates—places like Detroit, Cleveland, or Brownsville, Texas, for example.

What can be done to reduce neighborhood poverty?

Some of the more effective policies to reduce neighborhood poverty are not neighborhood policies, but rather antipoverty policies, because policies that reduce poverty will also reduce neighborhood poverty. Promising neighborhood-centered approaches to reduce disadvantage resulting from poor neighborhoods involve reducing neighborhood income and racial segregation. Policies to enable households with housing assistance vouchers to afford higher-income

neighborhoods and efforts to combat forms of exclusionary zoning that prevent creating affordable housing in affluent communities would reduce the prevalence of high-poverty neighborhoods. These policies have the potential to significantly improve the quality of life and life chances of many disadvantaged families.■

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[1]L. Quillian, "Segregation as a Source of Contextual Advantage: A Formal Theory with Application to American Cities," *RSF: The Russell Sage Foundation Journal of the Social Sciences*, 3, No. 2 (2017): 152–169; and L. Quillian, "Segregation and Poverty Concentration: The Role of Three Segregations," *American Sociological Review* 77, No. 3 (2012): 354–379.

[2]G. T. Wodtke, F. Elwert, and D. J. Harding, "Neighborhood Effect Heterogeneity by Family Income and Developmental Period," *American Journal of Sociology* 121, No. 4 (2016): 1168–1222.

[3]J. Ludwig, G. J. Duncan, L. A. Gennetian, L. F. Katz, R. C. Kessler, J. R. Kling, and L. Sanbonmatsu, "Long-Term Neighborhood Effects on Low-Income Families: Evidence from Moving to Opportunity," *American Economic Review: Papers and Proceedings* 103, No. 3 (2013): 226–231.

[4]R. Chetty, N. Hendren, and L. F. Katz, "The Effects of Exposure to Better Neighborhoods on Children: New Evidence from the Moving to Opportunity Experiment," *American Economic Review* 106, No. 4 (April 2016): 855–902.

[5]P. Sharkey, "The Intergenerational Transmission of Context," *American Journal of Sociology* 113, No. 4 (2008): 931–969.

School context, segregation, and inequality

David Deming

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Residential segregation by income is increasing in U.S. cities, with African American and Hispanic families in particular living in increasingly income-segregated communities.[1] At the same time, inequality in student achievement by income has decreased, and there has been a narrowing of racial achievement gaps. In this article, I explore the reasons for these trends, examine the implications of school segregation for school outcomes and inequality, and identify possible policy approaches to increasing the ability of schools to both improve academic outcomes and be more effective at teaching students to be contributing members of society.

Income segregation and the end of race-based busing

One reason for the increasing degree to which black and Hispanic families in the United States have seen their neighborhoods shift from mixed income to poor is the end of court-ordered desegregation. This shift in neighborhoods has had an effect on schooling outcomes. For example, the Charlotte-Mecklenburg School District in North Carolina used race-based busing to desegregate schools for over 30 years, as a result of *Swann v. CMS Board of Education* in 1971. However, after another lawsuit in 2002, busing was ended, and half of all students received a new school assignment. The school board then offered school choice as an option, to permit reassigned students to return to their original school, though few did. The population covered by the school district is about 55 percent black, but racial distribution among neighborhoods is very unequal. This area has also been found to have very low upward mobility, with children of families in the bottom income quintile having only a 4 percent probability of rising to the top income quintile.

This set of circumstances provided a unique opportunity to use quasi-experimental methods to study the long-run effects of school and segregation. In a study conducted by myself, Stephen Billings, and Jonah Rockoff, we found that attending a school with a larger share of minority or poor students resulted in lower test scores.[2] For white students, such a change in school population also reduced graduation rates, but we did not find such a reduction for black students. These effects were larger for earlier study cohorts. The school district targeted financial resources to high poverty schools beginning in 2005, about halfway through our study period, and we find evidence that this compensatory resource allocation may have closed gaps in academic outcomes.

While the effects of segregation on academic outcomes may have been somewhat ameliorated by increasing funding, we also found effects on crime, including large increases in arrest rates for those moved to schools with higher rates of minority students, that did not diminish over time. We also found suggestive evidence that increased exposure to crime-prone peers during school-age years leads to more crime in adulthood.[3] These findings have been supported by other studies including one I conducted with Stephen Billings and Stephen Ross, which found that concentrations of similar peers, especially nonwhite males, increases total crime.[4]

Separate but better?

While residential segregation has increased, inequality in student achievement has decreased and racial achievement gaps have narrowed. For example, as shown in Figure 1, reading achievement gaps for 9-year-olds between whites and blacks, and between whites and Hispanics, have narrowed significantly over the past four decades.

Though the fact that the increase in residential segregation has been accompanied by a decrease in racial achievement gaps may seem counterintuitive, it is of note that "no excuses" charter schools, which have had a demonstrably large effect on student achievement and postsecondary attainment, tend to have very high proportions of students of color. Studies of no excuses charter schools have found yearly gains large enough to close the black-white achievement gap.[5] In 2008, 70 percent of black students in charter schools attended a school with over 90 percent students of color; this compares to only 36 percent of black students in public schools.[6] This raises the question of whether it is acceptable for schools to be segregated if it actually results in students of color doing better.

What can we learn from these findings?

Improvements in school quality, including no excuses charter schools, can close achievement gaps for academic outcomes. However, outcomes that are more determined by peer interactions are harder to solve with policy changes. We need to decide what we are trying to accomplish with schools. If the primary job of schools is academics, that it may be acceptable to focus on improving academic outcomes and closing achievement gaps, to the exclusion of improving other outcomes. However, if schools are framed as social institutions that build civic participation, tolerance, diversity, and teach students how to be contributing members

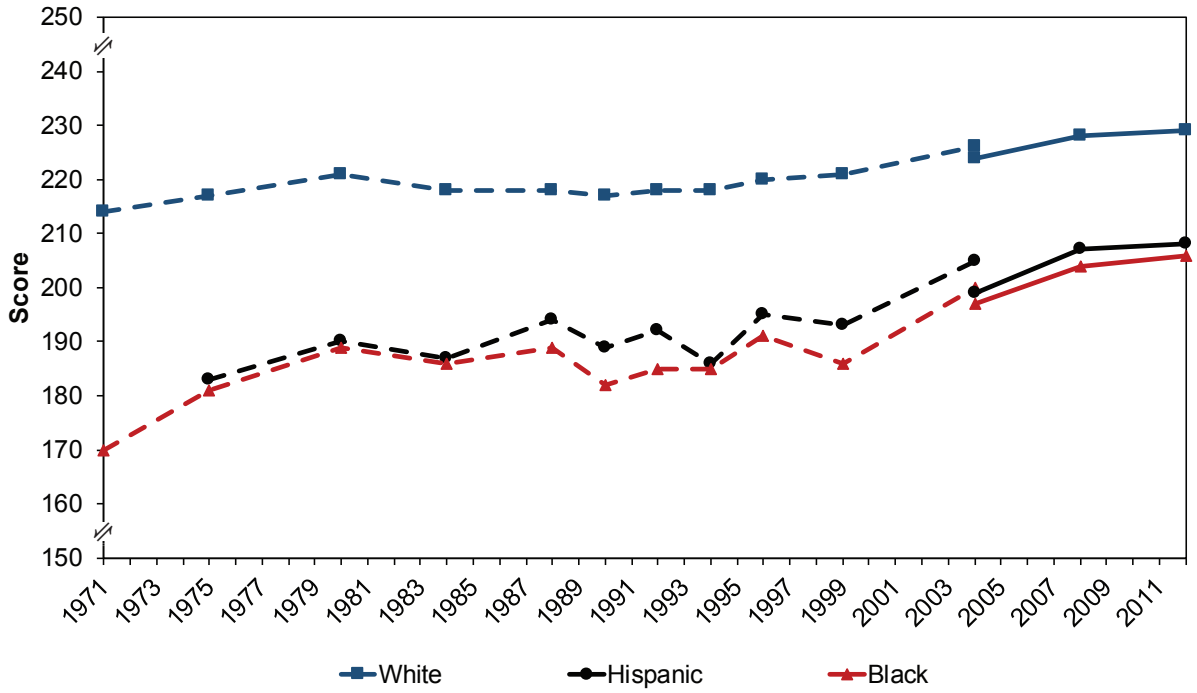

Figure 1. Narrowing of racial achievement gaps in reading.
Source: NAEP long-term trend data.
Notes: Dashed line shows original assessment format, solid line shows revised assessment format. White and black race categories exclude Hispanic origin.

of society as adults, then it is necessary to think more broadly about the implications of segregation.

One piece of evidence in this area comes from a study of Air Force Academy cadets, which found that white male students who were randomly assigned to more diverse squadrons in their first year were more likely to subsequently choose a black roommate, and reported a greater degree of racial tolerance.[7] Another study looking at the effects of socioeconomic school integration in Delhi, India, found that having poor classmates makes wealthy students more generous towards the poor and more likely to volunteer for charity.[8] These studies illustrate the idea that integration increases tolerance and diversity.

Implications for policy

School practice, those elements of school quality that are under a school's control, include the quality of teachers and principals, school organization, and curriculum. By improving school practice through increased funding, better management, or other interventions, racial and socioeconomic academic achievement gaps can be narrowed or even eliminated. However, there are other elements of school quality having to do with school context, such as neighborhood and peer groups, that are not under a school's control. If we think that schools should be increasing tolerance, diversity, and civic participation and decreasing crime, and we believe that those outcomes are driven by peer effects, then the only available policy levers to achieve the desired outcomes are deliberately integrative student assignment policies.■

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[3]D. J. Deming, "Better Schools, Less Crime?" *Quarterly Journal of Economics* 126, No. 4 (2011): 2063–2115.

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[5]See, for example, J. D. Angrist, S. R. Cohodes, S. M. Dynarski, P. A. Pathak, and C. R. Walters, "Stand and Deliver: Effects of Boston's Charter High Schools on College Preparation, Entry and Choice," *Journal of Labor Economics* 34, No. 2 (2016): 275–318.

[6]E. Frankenberg, G. Siegel-Hawley, and J. Wang, *Choice Without Equity: Charter School Segregation and the Need for Civil Rights Standards*, The Civil Rights Project/Proyecto Derechos Civiles at UCLA, Los Angeles, CA, 2010.

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Does schooling increase or decrease social inequality?

Stephen Raudenbush

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> *At the present moment it is certain that the school, while being a "training and educational" institution, is at the same time a piece of social machinery, which tests the abilities of the individuals, which sifts them, selects them, and decides their prospective social position.*
>
> —Pitirim Sorokin, 1959

Considering the enduring question in educational sociology of whether experience in school increases or decreases social inequality can bring a new perspective to the analysis of school policy. This article adds to the debate by proposing a causal framework that I developed with Robert Eschman for explicitly stating and evaluating claims about the contribution of schooling to social inequality. We use a counterfactual model to synthesize findings from four different types of interventions studied over the past century: universal pre-kindergarten, extending the school day, extending the school year, and increasing required years of schooling.[1]

What is social equality in education?

A widely held belief is that the purpose of schooling is to produce knowledge, dispositions, and capacities—skills—that are useful in the labor market and in life. An efficient school, like a firm that produces high profits, generates skills equated with high test scores. The function of the public schooling system is to promote a common skill set for all students, though some schools are better than others at promoting skills and students vary in their capacity to obtain these skills.

After passage of the Elementary and Secondary Education Act in 1965, the key objective of U.S. education policy has been to reduce social inequality in educational opportunity. Reauthorization of this Act in 2002 mandated sanctions against schools whose low-income and minority children had low test scores.

However, despite the attempts over the past half-century to reduce inequality, it has persisted. Theories offered to explain this persistence include that schools are a weak force, particularly compared to parents or homes, or that schools actually perpetuate inequality.[2] Some argue against school investment as a path to reducing inequality, stating that the home environment is more important than the school environment, and that increased investment alone has not been effective in raising student achievement.[3] However, these arguments are not grounded in a causal model for schooling.

A causal model

Robert Eschman and I contend that past models of schooling outcomes are missing a counterfactual—what would occur if a child did not attend school. We propose that the effect on a particular outcome that can be attributed to school depends on the quality of instruction the child will experience at school, compared to that they would experience if they did not attend school. This child-specific model leads us to hypothesize that expanding universal publicly funded schooling will reduce inequality both through providing access to more students, but also because disadvantaged children will gain more from that access than will their more advantaged peers. We also predict that this equalizing effect will be larger for younger children than for older children.

Research evidence

These hypotheses are supported by a review of the evidence for four types of interventions: (1) increasing access to early schooling, (2) extending the school year, (3) lengthening the school day, and (4) increasing the number of years of required schooling. First, our review of 15 large-scale studies of early schooling in eight countries indicates that preschool reduces inequality because children of low socioeconomic status gain more than do children of higher socioeconomic status.[4] Second, evidence suggests that social inequality grows during the summer months, with effects that are large and cumulative, and that extending the school year helps to close this gap.[5] Third, instructional time can be increased by extending the school day. The evidence is mixed about whether such an expansion is of greater benefit to low-income children, though there is evidence that students from low-income families gain more from full-day kindergarten than do other students.[6] Finally, the number of years of compulsory schooling could be increased. Increasing secondary schooling does reduce inequality by reducing the gap in access to school. However, as predicted by our model, among these older students, those from low-income families benefit less from a year of secondary schooling than do those from higher-income families.

Policy implications

One might conclude from prior research that it is worth investing in interventions to reduce inequality only when

children are young. However, it is important to note that early investment increases skill levels for low-income children, thus delaying the onset of skill differentiation between low-income and higher-income children, and prolonging the period during which school is operating as an equalizing force in their lives. In this way, early schooling increases the capacity of later schooling to reduce inequality.

The quality of schooling available to low-income students is lower than that available to higher-income students; however, because the counterfactual (the quality of instruction they would receive in the absence of school) is so much worse for children from low-income families, those students gain more than their higher-income peers, even from this lower-quality schooling. Therefore, if the quality of schooling available to low-income students could be increased, this would multiply the effects of the early interventions, raising skill levels even more.

There is good reason to expect that a dynamic instructional model with a relentless commitment to student learning can produce dramatic and lasting results. Such a model would involve smaller class sizes, frequent assessment of students, and individualized instruction that incorporated a variety of tools as needed, such as one-on-one tutoring. Evidence that such an approach can work comes both from research on effective charter schools, and recent work I have done with colleagues Elizabeth McGhee Hassrick and Lisa Rosen.[7]

A dynamic instructional model builds on emerging evidence that more and better early schooling equalizes early skill, and increases the benefit of later instruction for those of low socioeconomic status, while more and better later schooling capitalizes on early skill gains, delays the emergence of skill inequality, and sustains the capacity to learn. It appears that schooling can have a powerful equalizing effect despite, or even because of, the fact that there is such great disparity outside school walls.■

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[1]This work is described in greater detail in S. W. Raudenbush and R. D. Eschmann, "Does Schooling Increase or Reduce Social Inequality?" *Annual Review of Sociology* 41 (2015): 443–470.

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[3]E. A. Hanushek, "School Resources," in *Handbook of the Economics of Education*, Volume 2, eds. E. A. Hanushek and F. Welch (Amsterdam: North Holland, 2006).

[4]Raudenbush and Eschmann, "Does Schooling Increase or Reduce Social Inequality?"

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[7]W. Dobbie, R. G. Fryer, Jr., "Getting Beneath the Veil of Effective Schools: Evidence from New York City," *American Economic Journal: Applied Economics* 5, No. 4 (2013): 28–60.; E. M. Hassrick, S. W. Raudenbush, and L. Rosen, *The Ambitious Elementary School: Its Conception, Design, and Implications for Educational Equality* (Chicago: The University of Chicago Press, 2017).

Poverty and childhood health

Four panelists addressed the relationship between poverty and childhood health. Anna Aizer discussed the relationship between parental income and childhood health, and the mechanisms through which this relationship may work. She concluded that policy interventions targeting childhood health appear to substantially reduce the intergenerational transmission of inequality. Margot Jackson examined the simultaneous effects of poverty and poor health on children's cognitive achievement. The findings she presented support the idea that poverty is an important early factor in children's development, and also suggest that health investments are a key part of the antipoverty safety net. Rourke O'Brien presented evidence on the effects of the Medicaid expansions of the 1980s and 1990s on intergenerational economic mobility, concluding that early access to health insurance promotes mobility and that local variation in access explains some of the local variation in mobility. Claudia Persico explored whether in utero exposure to pollution helps to explain differences by income in children's cognitive and physical development. She concludes that exposure to pollution appears to cause lower test scores, and an increased likelihood of behavioral problems and cognitive disabilities, and that the "Superfund" cleanup program is associated with significant improvements in long-term cognitive and developmental outcomes for children. This set of articles summarizes their presentations.

How childhood health affects poverty in adulthood

Anna Aizer

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By any measure, there is a large income gradient in child health in the United States, meaning that children born into poorer families have worse child health. This relationship can be observed across a wide range of child health outcomes, including newborn health, infant mortality, and physiological differences in brain structure.[1] The gradient also increases as children age, meaning that a given decrease in income is associated with a larger decline in health for older children.[2] In this article, I explore current knowledge about the effect of parental income on child health and discuss the implications for policy.

The income-health gradient

Birth outcomes, such as the probability of low birth weight (defined as under 2,500 grams, or 5.5 pounds) or infant mortality, illustrate the income gradient in child health. For example, low birth weight occurs in about 10 out of 1,000 births for poor women, compared to six out of 1,000 births to nonpoor women.[3] Similarly, the rate of infant mortality is 14 out of 1,000 births to poor women, compared to eight out of 1,000 births to nonpoor women.

How child health affects future income

There is evidence that health in childhood affects earnings in adulthood, through two mechanisms. First, child health is correlated with adult health, and poor adult health lowers earnings. For example, a sibling study found that those with poor health in childhood had 24 percent lower earnings than their healthier siblings.[4] Second, child health can affect schooling and cognitive achievement, which can in turn affect income. For example, a study of the effects of the eradication of hookworm disease in the American south in the early 1900s found large increases in educational attainment attributable to the health improvement.[5]

Pathways through which family income affects child health

Families with fewer economic resources clearly have less ability to spend money in ways that enhance their children's health, but two additional factors are relevant. First, education matters; those with higher educational attainment are more likely to follow medical treatment plans. Second, poor families tend to have different beliefs about how to keep their children healthy, including being less likely to believe that they can influence their children's cognitive function with their own actions.[6]

There are many different mechanisms through which family income can affect child health. Several of these are discussed in other articles in this issue, such as access to medical care and health insurance (by Rourke O'Brien), exposure to pollution and environment toxins (by Claudia Persico), and violence (by Lawrence Berger). Other potential mechanisms include stress and mental health issues, infectious diseases, and income inequality and relative deprivation.

Stress, and mental health in general, also provide a mechanism through which family income can affect child health. The poor face a greater number of stressful events in their lives and have higher average levels of the stress hormone cortisol relative to their wealthier counterparts.[7] There is some evidence that this relationship is causal;

increases in income from the Earned Income Tax Credit (EITC) have been found to result in lower self-reported levels of stress in mothers.[8] Evidence also suggests a causal relationship between mothers experiencing even relatively mildly stressful events during pregnancy and child outcomes.[9]

Serious parasitic and bacterial diseases are prevalent among the poorest populations in the United States, such as those living in Appalachia and the Mississippi Delta. These diseases exacerbate poverty through effects on pregnancy outcomes, child development, and labor market outcomes.[10]

Research on inequality and relative deprivation indicates that relative income—where one's total income falls relative to other people in the society—more than absolute income, determines mortality in industrialized countries.[11] There is some evidence that high relative deprivation is associated with a higher probability of death for adults, but there is less evidence regarding deprivation and child health.[12]

Public policy, child health, and the intergenerational transmission of income

In a review of research on the effects of public programs for poor children on child health and well-being, Joseph Doyle and I concluded that health interventions were generally the most effective type of policy intervention.[13] In order to test this conclusion, I looked at social spending in Organization for Economic Cooperation and Development (OECD) countries, and identified the type of programs that were funded in each country.[14] I then tried to connect spending changes to changes in mobility and equality. We found that countries that increased their spending on health tended to have larger declines in inequality. This relationship did not hold true for social spending as a whole, or for other categories of social spending. I looked further at how countries spent money on health interventions. I found, for example, that within countries over time, increases in the number of pediatricians per capita and decreases in infant mortality predicted large reductions in both inequality of test scores and intergenerational income mobility 10 to 15 years later. These changes in inequality came entirely from raising test scores for those at the bottom of the distribution, not from lowering test scores for those at the top. While this analysis cannot show that the health spending caused inequality to decrease, it does reinforce the idea that health interventions are a particularly effective way to affect inequality.

Implications

Why are public health investments so productive? It may be that we know much more about how to produce child health than we do about producing other positive outcomes such as high test scores. In the United States, a very large amount of money—18 percent of the Gross Domestic Product—is spent on health, but little of that is spent on children; most is spent on the elderly. Evidence suggests that it may be worthwhile to consider spending more on children's health, where we know these expenditures can be productive in both the short and long run.■

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[9]See, for example, A. Aizer, L. Stroud, and S. Buka, "Maternal Stress and Child Outcomes: Evidence from Siblings," *Journal of Human Resources* 51, No. 3 (August 2016): 523–555.

[10]P. J. Hotez, "The Neglected Tropical Diseases and the Neglected Infections of Poverty: Overview of Their Common Features, Global Disease Burden and Distribution, New Control Tools, and Prospects for Disease Elimination," in *The Causes and Impacts of Neglected Tropical and Zoonotic Diseases: Opportunities for Integrated Intervention Strategies*, Institute of Medicine (Washington, DC: The National Academies Press, 2011). Pp: 221–237.

[11]A. Deaton "What Does The Empirical Evidence Tell Us About the Injustice of Health Inequalities?" in *Inequalities In Health: Concepts, Measures and Ethics*, eds. N. Eyal, S. A. Hurst, O. F. Norheim, and D. Wikler (Oxford, UK: Oxford University Press, 2013). Pp: 263–281.

[12]C. Eibner and W. N. Evans, "Relative Deprivation, Poor Health Habits, and Mortality," *Journal of Human Resources* 40, No. 3 (2005): 591–620.

[13]A. Aizer and J. J. Doyle, Jr., "Economics of Child Well-Being: Measuring Effects of Child Welfare Interventions," in *Handbook of Child Well-Being: Theories, Methods and Policies in Global Perspective Volume 3*, eds. A. Ben-Arieh, F. Casas, I. Frønes, and J. E. Korbin (New York: Springer, 2014). Pp: 1563–1602.

[14]The Organization for Economic Co-operation and Development (OECD) currently includes 35 countries.

Effects of poverty and health on children's cognitive development

Margot Jackson

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It is increasingly clear that poverty and health have a reciprocal relationship, with each affecting the other, and with the two working together to contribute to inequality by socioeconomic status. Health and poverty both vary over time, and each simultaneously obscures, mediates, and moderates the effects of the other. It is difficult to disentangle these intertwined effects, and most research to date has focused only on the effects of health on poverty or the reverse. In the work described in this article, Dohoon Lee and I examine how the reciprocal relationship between poverty and child health during early childhood affects estimates of each circumstance on children's cognitive development, and assess how these effects vary with age and across racial and ethnic groups.[1]

Inequality begins early

As has been discussed in earlier articles, there is a strong association between childhood adversity and inequality later in life. The possibility that the transmission of social inequality begins quite early is receiving increasing attention by both scholars and policymakers. There has also been a shift in how we think about the transmission of social inequality from a fairly static perspective—linking one generation of adults to income or occupational status among the next generation of adults—to a more dynamic perspective. This new perspective acknowledges that sensitive periods of human development structure children's progression through various social institutions, and eventually determine attainment in adulthood. Socioeconomic inequalities in children's health and skill development are present before children enter the school years and play an important role in shaping longer-term prospects for education and socioeconomic attainment.

Poverty and child health

Childhood health is particularly revealing because it is closely intertwined with both biological and social processes, and is strongly influenced by socioeconomic background. Health, independent of socioeconomic circumstances, affects both opportunities for upward mobility in the short-term such as skills acquisition and achievement, and risks of downward mobility in the long-term such as job loss and declining income. This evidence leads us to conclude that health is not merely a proxy for socioeconomic status, but is instead an important determinant of human capital development that operates through both social and biological mechanisms. In researching poverty and health, our hypotheses, and tests of those hypotheses, should not set up the effects of the two factors to be mutually exclusive.

Effects on child cognitive development

Most research on health and inequality looks at longer-term effects among adults. We focus on children not only because childhood is a sensitive period for skill development, but also because child health affects family well-being, not just individual outcomes. In particular, we focus on cognitive development because it is strongly affected by both poverty and child health.

Using data from the Fragile Families and Child Wellbeing Study, we show the effects of poverty and child health on child cognitive skills in Table 1. We find that both poverty and poor health have statistically significant negative effects on children's cognitive skills, but controlling for factors that do not change over time, such as demographic characteristics and socioeconomic status at birth, greatly decreases effect sizes. Using marginal structural models, we also estimated effects that account for time-varying confounding from variables such as family structure, parental employment, number of children, and the reciprocal effects of poverty and child health over time. That is, for poverty estimates, we controlled for child health over time, while for health estimates, we controlled for poverty over time. This approach did not greatly change the estimates of either poverty or poor health on cognitive skills.

As Figure 1 shows, we found different patterns for the effects of poverty and poor health on cognitive skills by age of the child. At age 3, there was little evidence of differences in cognitive development by either poverty or health status.

Table 1
Effects of Poverty and Child Health on Child Cognitive Skills

	No Control Variables	Controlling for Variables that Do Not Change Over Time
Poverty	-0.207	-0.052
Poor Health	-0.065	-0.030

Note: Control variables include: social, economic, demographic characteristics at birth; and maternal, paternal, and child characteristics.

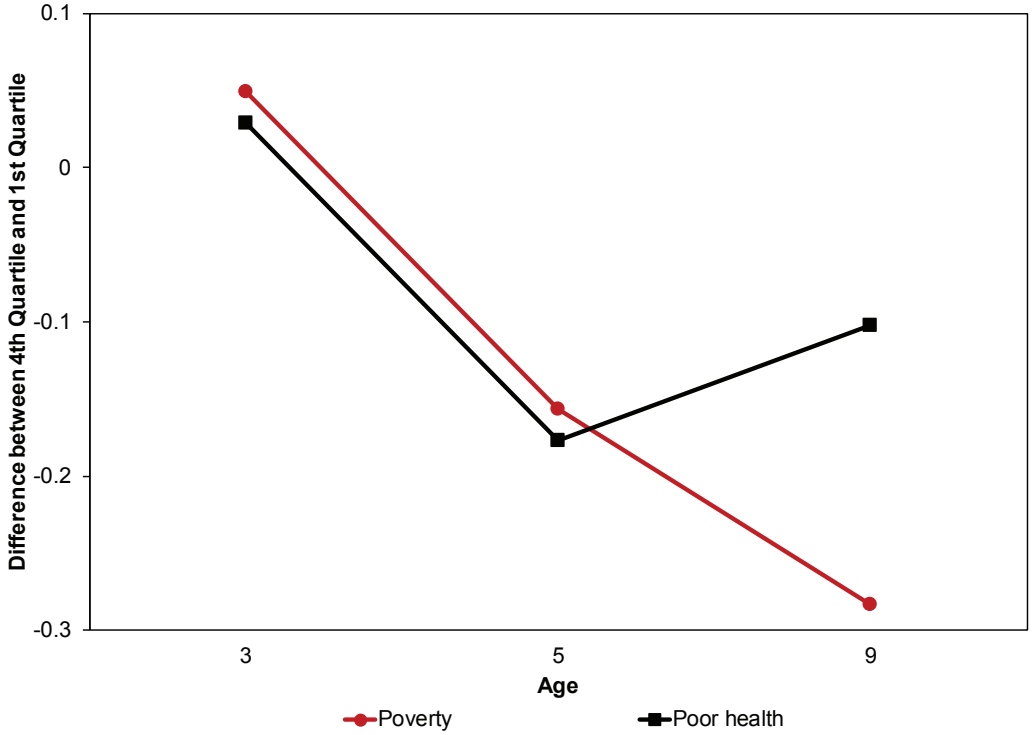

Figure 1. Effects of poverty and poor health on cognitive skills by age.

Notes: Skills differences are calculated between those at the 4th and 1st quartiles of poverty, and those at the 4th and 1st quartiles of poor health. The farther away from zero, the greater the difference.

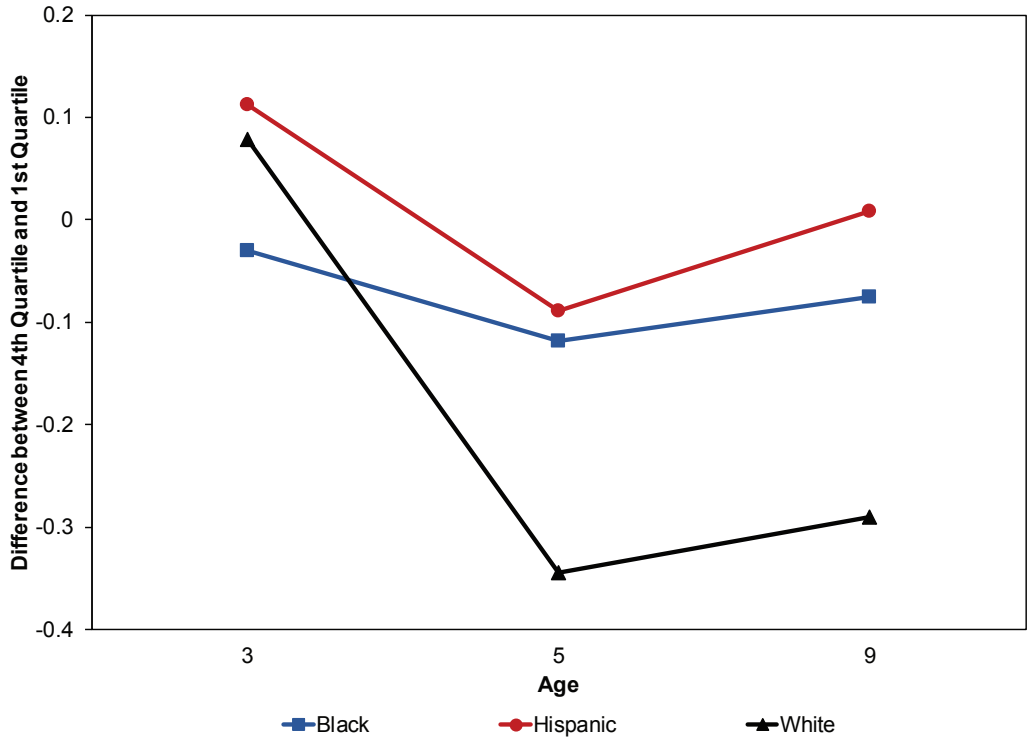

Figure 2. The effects of poor health on cognitive skills by race and ethnicity.

Notes: Skills differences are calculated between those at the 4th and 1st quartiles of poor health. The farther away from zero, the greater the difference.

That is, for example, we found little difference in cognitive skills between children from the wealthiest and poorest families. By age 5, at the start of formal schooling, however, there were significant differences in cognitive skills by both poverty and health status. However, the effects of poverty accumulate, strengthening by age 9, while the effects of health appear to level off after age 5.

While we find little variation by race or ethnicity in the effects of poverty on cognitive skills, as Figure 2 shows, the negative effects of poor health are largely driven by the effects on white children, rather than on black or Hispanic children. This finding is consistent with findings from other studies.[2] In work I did on the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), I found that among all eligible children, white children were the least likely to be in families receiving WIC benefits.[3] This finding, combined with the results from the study described here, suggests that in some cases, populations who may benefit most from interventions are the least likely to receive assistance.

Implications

These results confirm that poverty and poor health work simultaneously to shape children's cognitive development. Our findings are consistent with the idea that poverty is a "fundamental cause" of children's cognitive development, that appears quite early in life. In addition, our findings also suggest that health investments are a key part of the antipoverty safety net, given their effects on development independent of the effects of poverty.■

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Medicaid and intergenerational economic mobility

Rourke O'Brien

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Research has shown that there is geographic variation in levels of economic mobility (change in economic status), but the reasons for this variation are not well understood. One potential cause is differential access to health insurance. Whereas studies have shown that health insurance coverage may reduce the transmission of economic disadvantage from parents to children, to date there has been no direct assessment of the effect of expanding insurance coverage on intergenerational economic mobility in the United States. In this article, I describe work done with Cassandra Robertson to explore whether the Medicaid expansions of the 1980s and 1990s had an effect on intergenerational economic mobility.[1]

Medicaid expansions of the 1980s and 1990s

The Medicaid program was established in 1965 to help states provide health care to low-income people by providing health insurance coverage. In the 1980s and 1990s, federal and state changes to Medicaid greatly expanded the number of low-income infants and pregnant women eligible to receive this coverage. This expansion was associated with a number of positive changes, including sizable reductions in infant mortality and the incidence of low birth weight.[2] Among school-aged children, health disparities by income level were reduced, and there is evidence that these improved health outcomes continue as children become adults.[3] Medicaid expansions have also been associated with positive outcomes for low-income children in areas other than health, such as improved educational achievement and attainment including high school completion, college attendance, and college completion.[4] Finally, expanded coverage in early life has been associated with increased employment, higher wages, and reduced reliance on public assistance in adulthood.[5] Overall, the expansion of Medicaid coverage has been linked to improved health, education, and labor market outcomes, all of which provide important pathways for economic mobility.

Economic mobility

To directly assess the effects of the Medicaid expansions in the 1980s and 1990s on economic mobility, I use new county-level mobility estimates published by the Equality of Opportunity Project generated using Internal Revenue Service data.[6] Raj Chetty and colleagues compared the income rank of children at age 26 to their parents' income rank years earlier. They found that the possibility of upward mobility for children in poor families varied greatly depending on where they grew up.[7]

Before the Medicaid expansions began, there was a wide range of eligibility by state; when the expansions occurred, there were also very different implementation timelines across states. Over the time period of the expansions, while the average increase in the proportion of the population eligible for Medicaid throughout the United States was 63 percent, the increase in eligibility in individual states ranged from 4 percent to 264 percent. Because the within-state trends in the percentage eligible for assistance reflects both changing policy and changes in underlying demographics, we separate out only the change attributable to policy. We then make use of the policy-dependent variation in Medicaid coverage across states and over time to isolate the effects of Medicaid expansion on economic mobility.

We found small but statistically significant improvements in a child's income rank associated with increases in Medicaid eligibility. Because the mean increase in Medicaid eligibility between 1980 and 1993 (the years for which data is available) is 20 percentage points, we frame our findings in terms of those associated with that size increase. For example, we find that for children whose parents were at the 10th percentile of the income distribution, a 20 percentage point change in Medicaid eligibility is associated with a 1.8 percentage point increase in their mean income rank. Thus, a child who at age 26 who would have been in the 13th income percentile would instead be near the 15th income percentile as a result of Medicaid expansion. For children whose parents were at the 25th percentile of the income distribution, the increase in mean income rank is slightly lower at 1.6 percentage points, and the effect continues to shrink as we move up the parental income distribution.

In addition to looking at children's rank in the income distribution as adults, we also looked at college attendance. Here we also find evidence suggesting that expanding Medicaid eligibility increased mobility, in this case by reducing the extent to which parental income predicted college attendance. So, for example, for children of parents at the 10th percentile of the income distribution, a 20 percentage point increase in Medicaid eligibility is associated with a 1.4 percentage point increase in college attendance. Again, this effect decreases as parental income rank increases.

Policy implications

Our findings suggest that expansions in Medicaid coverage for low-income pregnant women and infants in the 1980s

and 1990s improved the life chances of low-income children, by small but statistically significant amounts, and help explain variations in mobility by location and by when a child was born. Although there is still more work to be done in exploring all of the pathways through which Medicaid expansion may improve mobility outcomes, including birth weight, educational attainment, and incidence of teenage pregnancy, policies that increase early access to health insurance appear to hold promise for increasing intergenerational income mobility.■

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[6]The data described here may be downloaded at www.equality-of-opportunity.org.

[7]R. Chetty, N. Hendren, P. Kline, and E. Saez, "Where is the Land of Opportunity? The Geography of Intergenerational Mobility in the United States," *The Quarterly Journal of Economics* 129, No. 4 (2014): 1553–1623.

Inequality before birth: Effects of in utero pollution exposure on children's development

Claudia Persico

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Pollution is extremely widespread in the United States, as shown in Figure 1, which maps the location of two types of toxic waste sites in the United States in 2015. The blue dots show the location of Toxic Release Inventory sites, which are factories that are required to report their emissions to the Environmental Protection Agency (EPA) because they are using certain EPA-identified toxic chemicals. The red dots show the location of "Superfund" sites, which are the most contaminated federal toxic waste sites. Superfund sites are generally no longer operating, and the EPA is in the process of cleaning them up. Although we do not currently have comprehensive evidence on which pollutants are harmful and what type of exposure causes negative health effects, the evidence we do have is worrisome and suggests a source of inequality that has not yet been explored in depth. Namely, since African American, Hispanic, and low-income families are more likely to live in close proximity to toxic waste sites, where housing is less expensive, it is possible that exposure to pollution—which more affluent families can avoid because they can afford more costly housing—is one mechanism through which poverty produces negative cognitive and health outcomes over time. In the study described in this article, David Figlio, Jeffrey Roth and I examine whether prenatal proximity to Superfund sites is associated with negative cognitive and developmental effects through childhood and into adulthood .[1] These effects can have long-term consequences on socioeconomic outcomes such as academic achievement and adult income, as noted in several other articles in this issue including those by Ariel Kalil and Helena Duch in this section, and by Anna Aizer and Margot Jackson in the section on poverty and parenting young children.

What are the consequences of exposure to commonly encountered pollution levels?

As illustrated in Figure 1, toxic waste exists in every major U.S. city. The Comprehensive Environmental Response, Compensation, and Liability Act, known as Superfund, is the largest and most expensive federal program to clean up toxic waste in the United States. Eighty million people, or 1 in 4 Americans, live within three miles of a Superfund site, and about 11 million Americans, including 4 million children, live within one mile of a Superfund site. There is a large literature establishing associations between mothers who are exposed to pollution during pregnancy and negative birth outcomes. For example, Janet Currie, Michael Greenstone, and Enrico Moretti found that the cleanup of Superfund sites was associated with a 20 to 25 percent reduction in the risk of congenital anomalies in infants.[2] However, less is known about the long-term consequences of prenatal exposure to commonly-encountered levels of pollution. It is possible that pollution affects brain development, causing negative consequences in addition to, or even in the absence of, birth outcomes.

One challenge in assessing the effects of pollution is that toxic waste sites lower nearby housing values, so low-income people are more likely to live in close proximity to these sites than are people who have higher incomes and can afford to spend more on housing. Thus, a simple comparison of people who live near Superfund sites to those who do not may capture not only the effects of pollution, but also some effects of being low-income. In our study, we are able to account for this by comparing siblings in families living within two miles of a Florida Superfund site where at least one sibling was conceived before or during cleanup of the site, and the other sibling or siblings were conceived after site cleanup was completed. The Florida data combines birth and school records to provide information on children born between 1994 and 2002.

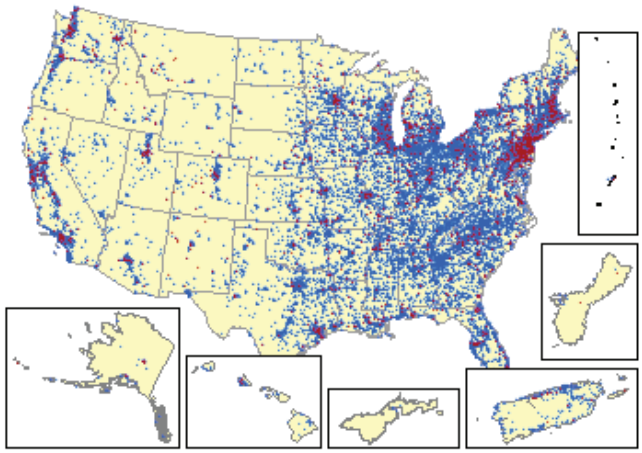

Figure 1. Locations of Toxic Release Inventory and Superfund sites in the United States in 2015.

Note: Toxic Release Inventory facilities are shown in blue and sites on the Superfund National Priorities List are shown in red.

Source: National Institutes of Health, Department of Health and Human Services. https://toxmap.nlm.nih.gov/toxmap/

In addition to replicating effects on birth outcomes, such as health at birth and the likelihood of low birth weight, that were identified in earlier work, we find a significant effect of proximity to a Superfund site before cleanup on school outcomes. For families living within two miles of a site, siblings conceived prior to the completion of cleanup were 7.4 percentage points more likely than siblings conceived after cleanup to repeat a grade, and 6.6 percentage points more likely to be suspended from school. Closer proximity was associated with even larger effects; children conceived within one mile of a Superfund site prior to cleanup had a 12.5 percentage point increase in the likelihood of repeating a grade, and notably, a 10 percentage point increase in the likelihood of cognitive disabilities, compared to their siblings who were born after cleanup (and therefore not exposed to the pollution). Prenatal exposure to Superfund site toxins was also associated with test scores that were lower by between 0.06 and 0.12 of a standard deviation compared to a sibling who was not exposed to the pollution.

The large size of these effects is particularly notable given several factors that could result in underestimation. First, parents tend to invest more in earlier-born children than later-born children, so in this study those additional investments would have favored the siblings born prior to site cleanup. Later-born children could also have experienced some effects of pollution from the Superfund sites, since toxins would tend to accumulate in the bodies of mothers over time; they could also have been exposed to other sources of pollution. Finally, it is possible that parents took steps to reduce their own and their children's exposure to pollutants.

Policy implications

This study is the first to investigate the long-term effects on children of prenatal exposure to commonly encountered levels of pollution. These findings show that exposure to pollution has detrimental effects on children's development. Further, the results suggest that cleanup of Superfund sites can have significant positive effects on a variety of long-term cognitive and developmental outcomes for children. Because disadvantaged families are more likely to live near Superfund sites, both the negative effects of pollution and the benefits of cleanup are more likely accrue to low-income, black, and Hispanic children.

Given public debate over whether the Superfund program should be continued, it is important to understand the true costs of pollution and the benefits of cleaning up toxic waste sites. For example, since the cost of providing special education in public schools is very high, it is likely that the Superfund program could pay for itself in a fairly short period of time simply by reducing the incidence of cognitive disabilities. Furthermore, cleanup of Superfund sites located in areas with particularly high population density could result in particularly large cost savings, since more children would reap the benefits.■

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[1]C. Persico, D. Figlio, and J. Roth, "Inequality Before Birth: The Developmental Consequences of Environmental Toxicants," NBER Working Paper No. 22263, National Bureau of Economic Research, May 2016.

[2]J. Currie, M. Greenstone, and E. Moretti, "Superfund Cleanups and Infant Health," NBER Working Paper No. 16844, National Bureau of Economic Research, March 2011.

Poverty and early care and education

Three panelists addressed the relationship between poverty and early care and education. Jane Waldfogel summarized current evidence on early childhood policies and suggested that expanding policies that promote early learning, improving income supports, and implementing complementary policies during a child's years in K–12 schooling could help reduce the intergenerational transmission of poverty. Terri Sabol considered the question of what constitutes "high-quality" early care and education, which is often associated with better outcomes for children, and described two studies of quality assessment tools, suggesting that measures of structural quality such as class size and teacher-child ratios are not consistently associated with children's learning, whereas measures of the quality of teacher-child interactions are. Christina Weiland considered the implications of scaling up preschool programs that have been successful in improving academic achievement and reducing inequality. She presented the results of a pilot study to expand the Boston Public School's prekindergarten model to community-based preschools, which brought to light a number of facets of these centers that presented barriers to implementation, but also identified some advantages and opportunities in locating preschools in community-based organizations. This set of articles summarizes their presentations.

What is the role of early childhood policies in fighting intergenerational transmission of poverty?

Jane Waldfogel

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The persistence of large achievement gaps by socioeconomic status is an important factor in the intergenerational transmission of poverty. Because these gaps are already present early in life, there is an opportunity for early childhood policies to make a difference. This article summarizes current evidence on early childhood policies and identifies promising policies in the areas of early learning, education, and income support.

Why focus on educational inequalities?

In 1964, President Johnson declared an "unconditional war on poverty in America." Fifty years later, we have made some progress on income poverty. Figure 1 shows rates over time for the official poverty measure and the Supplemental Poverty Measure, carried back historically and adjusted for inflation. Poverty assessed using the official poverty measure, which looks only at pre-tax cash income and uses a threshold set at three times the cost of a minimum food diet in 1963, has fluctuated but not changed greatly over time. However, there has been a dramatic drop in poverty as measured by the Supplemental Poverty Measure, which accounts for a fuller range of income sources and expenses and uses thresholds calculated from Consumer Expenditure Survey data on basic necessities (food, shelter, clothing, and utilities) and adjusted for geographic differences.

In addition to reductions in income poverty, there has also been progress on decreasing inequalities in other areas such as nutrition and health.[1] However, very large educational inequalities remain, and these present a major challenge in fighting intergenerational transmission of poverty. Although racial and ethnic disparities in educational outcomes have narrowed, there are large and growing achievement gaps between children from low and high socioeconomic status families. These growing socioeconomic status gaps in achievement have occurred in parallel with growing gaps in family resources—a phenomenon that Sara McLanahan calls "diverging destinies."[2] McLanahan finds that since the 1960s, educational attainment is increasingly associated with a variety of outcomes, so that children born to women with high levels of education also benefit from resources of parental time and money, while those born to women with

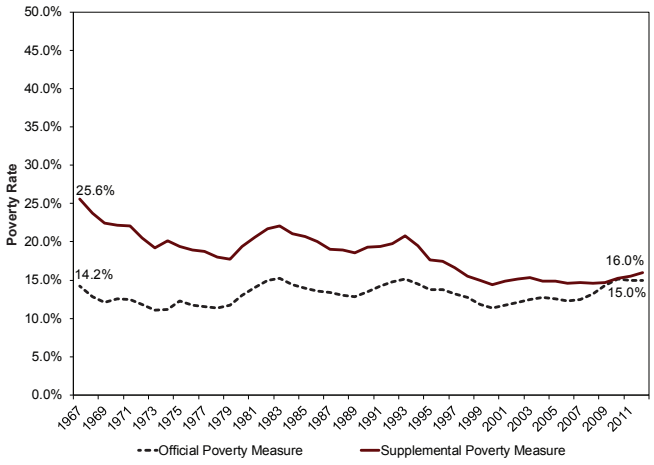

Figure 1. Official and Supplemental Poverty Measure rates, 1967–2012.

Note: Rates based on the Supplemental Poverty Measure are anchored in 2012 and carried back historically, adjusting for inflation.

Source: C. Wimer, L. Fox, I. Garfinkel, N. Kaushal, and J. Waldfogel, "Progress on Poverty? New Estimates of Historical Trends Using an Anchored Supplemental Poverty Measure," Demography 53, No. 4 (August 2016): 1207–1218.

low education levels lag behind. Investments in children are also diverging, as shown by Greg Duncan and Richard Murnane, who found that between 1972 and 2006, the gap in per-child parental spending on education-related items and activities such as music and art lessons, children's books and toys, sports equipment and classes, and tutoring between children from families in the top fifth and bottom fifth of the income distribution grew from about $2,700 in 2008 dollars in 1972 to over $7,500 in 2005.[3] Robert Putnam found a similar divergence over time by education level in the time spent by parents reading to their children.[4]

Educational inequalities in the United States compared to other countries

To put the U.S. inequalities into perspective, Bruce Bradbury, Miles Corak, Elizabeth Washbrook, and I compare the United States with Australia, Canada, and the United Kingdom. We found that, compared to these other wealthy countries, the United States has larger achievement gaps and less intergenerational mobility.[5] Although there is a gap in family resources by socioeconomic status (represented by education level) in all four countries, this inequality is starkest in the United States. For example, in the United States, incomes for families with high levels of parental education (bachelor's degree or higher) are 1.8 times as large as in medium-educated families (some education beyond high school), and three times as large as in low-educated families (high school degree or less). The comparable differences are markedly smaller in the other three countries, particularly Australia. The disadvantage experienced by children from low socioeconomic status families in the United States is compounded by the fact that the U.S. safety net and supports for working families do the least among the four countries to combat income inequality.

The countries also differ on educational policies and outcomes. With respect to universal preschool, both Australia and the United Kingdom provide universal preschool, but in the United States and Canada—where preschool is not universal—there is significant variation by socioeconomic status. Families with high parental education have higher enrollment in preschool than families with low parental education. With respect to cognitive skills and achievement of children, inequality by parental education is significantly larger in the United States than in the other countries both at school entry and during school years.

What can we do in early childhood to reduce intergenerational transmission of poverty?

Children from low socioeconomic status families face considerable challenges, and more so in the United States than in other countries. Their parents not only lack education, they also tend to be younger, live in less stable families, and have lower incomes than high socioeconomic status families, who are investing heavily in their children. These inequalities are exacerbated by a less robust safety net than is provided by peer countries, lacking paid parental leave, universal preschool, reliable income supports, and until recently universal health care.

Children from low socioeconomic status families are behind even before they start school, meaning there is an important role for early childhood policies. While not all early childhood policies are effective, we do have good evidence to support expanding policies to promote early learning. Such policies would include evidence-based parenting programs for families with infants and toddlers[6] and universal high-quality preschool for three- and four-year-olds.[7]

In addition, it is important to expand income support policies to raise family incomes for the poor and near-poor by: raising the minimum wage; expanding the Earned Income Tax Credit and the Child Tax Credit, and/or implementing a universal child allowance (which would provide a cash grant to all families with children); strengthening food and nutrition programs such as the Supplemental Nutrition Assistance Program (SNAP), school meals, and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC); and providing supports for working families, through measures such as paid family and medical leave.

The effects of early childhood policies would be enhanced by complementary policies in the school years. In addition to continued income supports, policies to improve the quality of teaching and learning in schools would focus on: recruiting, supporting, and adequately compensating more effective teachers; implementing more rigorous curricula such as Common Core; and setting higher expectations and providing more support for low-achieving students through evidence-based interventions.

While the U.S. record sometimes suggests there is little we can do to reduce educational inequalities and the intergenerational transmission of poverty, the experience of peer countries suggests we can and should do better.■

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What is "high-quality" early care and education?

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Jane Waldfogel suggested the provision of "high-quality preschool" as one component of a strategy to reduce the intergenerational transmission of poverty; however, what constitutes "high quality" with regard to early care and education is not clear-cut. In this article, I offer some ways to consider this very challenging question by describing a study that looked at whether common indicators of preschool quality are related to child outcomes.

Quality early care and education

Recent increased investment has expanded low-income children's access to early care and education programs. Although, as Jane Waldfogel pointed out, there are disparities in preschool attendance between children from lower and higher socioeconomic status families, nevertheless a sizable proportion of low-income children attend center-based care in the United States. In this article, I do not look at how we can increase access to these programs, but rather at the experiences of children who are already attending center-based care, and how we might think about measuring and improving those experiences.

Evidence of the effectiveness of early care and education at providing school-readiness skills varies: model programs from the 1960s and 1970s such as Perry Preschool and Abecedarian that served a small number of very disadvantaged children were found to be very effective. However, effect sizes got smaller as these programs were scaled up to statewide prekindergarten programs, and even smaller for Head Start, the largest federally funded program for low-income children. Even within a program, effectiveness may vary greatly; for example, a study across centers of the effects of Head Start on children's cognitive and socioemotional skills found that some centers had very large effect sizes and were much more effective than other locally available programs, while others were much less effective than local alternatives.[1]

This large variation across and even within program models raises the question of *why* some programs produce larger effects than others. There are a number of different ways to consider this question, including who the comparison group is, which child outcomes are examined, characteristics of children included in the study (such as age, race and ethnicity), the location of the program, and the length and intensity of the intervention. However, here I focus on quality of the programs; that is, what it is about how the program operates that explains differences in effectiveness.

Measuring quality

Our thinking about quality can be somewhat circular, in that we identify programs as high quality *because* they produce results, rather than trying to identify the particular components that make programs effective. But early childhood programs are complex, with many moving parts. What drives quality, how to measure quality, and how to ensure quality in an early childhood setting have largely remained hidden in a "black box." While the field has taken initial steps to improve measures of quality, we need much better knowledge on what specific program inputs and practices are linked to which outcomes for children. We cannot invest in—or improve—quality when we do not understand what it is.

I draw on theories from developmental psychology theory to try to focus more on the contexts in which children learn. Attachment theory suggests that when parents provide emotional support, and a predictable, consistent, and safe environment, children become more self-reliant and are able to take risks as they explore the world because they know that an adult will be there to help them if they need it. Social-motivation theories suggest that children are most motivated to learn when adults support their needs. These theories apply to classrooms as well, suggesting that the primary caregiver in the classroom can act as a secure base to explore the world. Although curriculum may matter, it is really how the teacher implements the curriculum that makes the biggest difference.

A model of classroom quality must of course include structural elements of quality such as health and safety, class size and child-adult ratios, and staff qualifications. But we also need to consider process elements of quality such as the classroom environment and teacher-child interactions. However, when we think about regulating or assessing quality, the focus is usually on structural elements. These elements tend to be both relatively straightforward and relatively inexpensive to measure.

A popular way of assessing both structural and process elements is to use Quality Rating and Improvement Systems (QRIS), state-level rating systems that provide consumer-friendly levels of quality that can be easily accessed by parents. In addition, these systems also provide services and supports to providers that are specifically designed to raise the quality of early care and education programs. States can select individual indicators of quality, which are weighted to create an overall rating, with the intent that higher ratings represent higher levels of quality. Table 1 shows the proportion of states using particular measures to assess quality within their QRIS.

Table 1
Proportion of States Using Particular QRIS Measures

Quality Indicator	Percentage of States Using Indicator for Rating in Quality Rating and Improvement Systems
Classroom Environment	98%
Staff Qualifications and Training	95%
Family Partnerships	90%
Program Administration, Management, and Leadership	88%
Curriculum	83%
Health and Safety	75%

While the QRIS model is popular and has been adopted by numerous states, implementation has far outpaced the research. There is no strong empirical evidence to establish whether the QRIS model is the best way to measure quality, particularly in the current landscape where many children are already attending programs that meet minimum regulations for quality, and most past research was done in the 1990s or early 2000s when the quality of care was much lower. The QRIS model assumes a direct relationship between all quality indicators and child outcomes, though it is not clear that this actually holds true.

Are common indicators of quality related to child outcomes?

A study I conducted with Sandra Soliday Hong, Robert Pianta, and Margaret Burchinal assesses whether the assumptions of the QRIS model are true. We looked at state-funded pre-kindergarten programs using five quality indicators: (1) staff qualifications, including teacher and director level of education and years of experience; (2) staff-child ratio and group size; (3) family partnerships; (4) learning environment; and (5) the quality of interactions between teacher and children. The first four indicators are among the most popular QRIS indicators; the fifth is an additional indicator we added that was not commonly used in QRIS at the time (this has since changed). Of the five indicators, we found that (5), the measure of teacher-child interaction quality, was the strongest predictor of children's learning in math, pre-reading, language, and social skills, followed by (4), the learning environment.[2] The structural quality measures of staff qualifications, staff-child ratio, and family partnership were less consistently associated with children's learning.

We then tried to replicate these results in a larger study including programs with a wider range of quality; we used data from six large studies of early care quality covering 2,078 programs attended by over 11,000 three- and four-year-olds. The conclusions of this larger study were similar to the first, although we did find that the education level of the program director was related to child outcomes.[3] In the larger study, we were also able to include a curriculum measure, and we found that to be associated with social skills.

Taken together, these two studies suggest that structural measures are not consistently associated with child outcomes, with the exception of the program director's education level, which may in fact be an indicator of program climate or some other process measure. We do find that teacher-child interactions are associated with children's learning. We recognize that this presents a challenge to those seeking to rate preschool programs, since it is expensive and time-intensive to conduct high-quality, reliable classroom observations using evidence-based tools. These observation-based measures were also not developed to be used in a setting where the continued existence of the program depends on the outcome, so it is an open question of whether it is the best tool to use within preschool accountability and monitoring systems. Overall, the studies suggest that we need to align our conceptual framework about quality to the ways in which we are actually measuring it, particularly in policy contexts.

Future directions

One interesting question that comes from this research is why we found no connection between family partnership and child learning. There is certainly evidence that parents play a very important role in children's development—Jane Waldfogel noted that parental education is strongly associated with children's achievement. So why are the measures that we typically use to assess family partnership not associated with child outcomes? We found that these measures typically focus on what parents are doing in their children's school—whether they are volunteering, visiting the classroom, and attending family events. Less attention is paid to direct services being provided to parents, including parenting interventions. There seems to be an opportunity to expand how we think about measuring family partnership in a way that captures something related to child outcomes. For example, we surveyed parents in Illinois to identify which types of education and financial support services they currently have access to through their children's early education program, and what they would like to have offered. We found several types of services, including career support, college support, and financial coaching, in which many more parents had an interest than had current access.

Overall, future efforts to measure quality need to focus more on processes rather than primarily on structural components. Great opportunities remain to improve our investment in early childhood by being thoughtful about program content.■

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Can successful preschool programs work outside public schools?

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It has been well established, as Jane Waldfogel noted in her article in this issue, that preschool *can* improve child academic achievement and reduce inequality. The next question, then, is whether successful programs can be scaled up to reach a broader population. In this article, I look at a pilot program to expand the Boston Public School's prekindergarten model to community-based preschools.

Public and community-based preschool

Overall, 45 percent of children who receive state preschool funding are served in programs operated by private organizations rather than public schools.[1] It is likely that the setting for preschool matters; there is some evidence that children make larger gains in cognitive and socioemotional skills when they are in public school-based programs compared to community-based preschools.[2] The mechanisms through which this could occur are not clear; it is possible that the higher pay that public schools are often able to offer attracts stronger teachers, that there are differences in how programs are structured, or that different types of families tend to be selected into different settings.

There are also long-standing concerns about having a "two-tiered" system, where fewer resources are available to community-based programs compared to those that are based in public schools.[3] With many public schools facing demand for preschool that exceeds availability, it is likely that a significant number of children will continue to attend preschool in other settings; it is thus important to understand the implications of this mixed-setting approach, and to determine whether there are ways to ensure that all children have access to high-quality preschool.

The Boston Public Schools prekindergarten model

In Boston, prekindergarten for four-year-olds became available district-wide in 2005. The program model was adjusted after early evidence showed that instructional quality could be improved. The district then made significant investments in program quality, including implementing proven play-based language, literacy, and mathematics curricula, and providing regular meetings with coaches to help support teachers as they implemented the new curricula. Since 2005, prekindergarten teachers in the district have been paid on the same scale as K–12 teachers and are subject to the same educational requirements. The educational requirements in the district are fairly stringent. For example, teachers must have a master's degree within five years of their start date. While the program is open to any child in the city, the high proportion of students in the district who receive free or reduced-price lunch (around 70 percent) means that prekindergarten is effectively targeted to a largely low-income population.

A study I completed with my colleague Horiokazu Yoshikawa found that the Boston program had moderate to large effects on skills targeted by the program, namely, children's vocabulary, early reading, and math skills.[4] We also found smaller effects on children's self-regulatory skills. The Boston program differed from other large-scale prekindergarten programs in the quality of instruction provided to children in the class. As Figure 1 shows, while other programs do a similarly good job of providing emotional support to children, the Boston program outperforms others at providing instructional support.

Expansion to include community-based centers

In 2013, the Boston program expanded, through a pilot program, to include 10 community-based day care centers, with a total of 14 additional classrooms. Policymakers in Boston were interested in expanding into community-based programs not only to address public school capacity issues, but also to attempt to reach a different population. Unlike many of Boston's public school-based sites, the community-based sites are able to offer full-day care, which may provide a more attractive option to working parents. Programs in the pilot received supports that matched or were similar to those in the public schools: the same curricula materials and similar training and coaching; support and training for center directors; and increased pay. Prior to the pilot, teachers in community-based centers were earning less than the Massachusetts average; the pay raise increased their hourly wages from an average of around $13 to $23 in 2014 dollars. The hope was that this increase would improve instruction quality and increase teacher retention, satisfaction, and motivations, ultimately improving child outcomes.

Teachers in the community-based programs had a similar amount of teaching experience compared to those in the Boston Public Schools, but were much less likely to have a master's degree. The student population also differed, partly

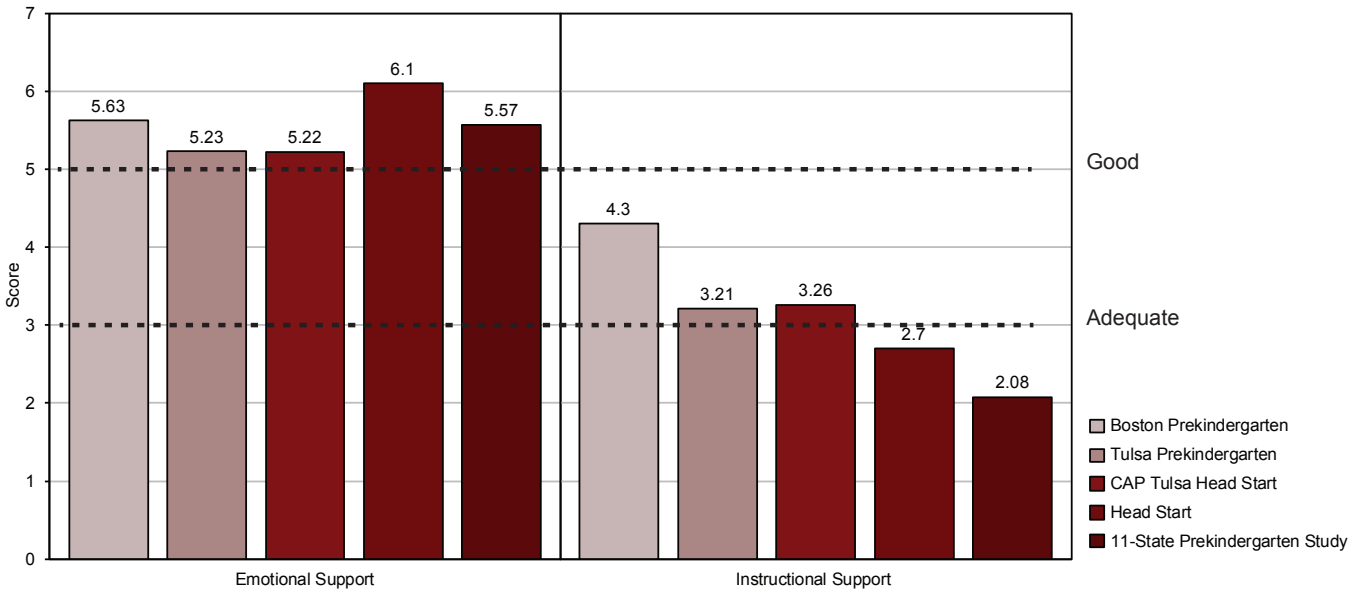

Figure 1. Boston prekindergarten quality in the context of other large-scale programs.

Notes: Scores measured using the Classroom Assessment Scoring System, an observational instrument with a seven-point scale.

Source: A. Chaudry, T. Morrissey, C. Weiland, and H. Yoshikawa, Cradle to Kindergarten: A New Plan to Combat Inequality (New York: Russell Sage, 2017).

because of the neighborhoods in which the community-based centers were located; students at the pilot sites were about twice as likely as those in the public schools to be African American.

Evaluating the outcomes of program expansion

The Boston Public Schools pilot provided an opportunity to study whether a successful program model can be scaled up to reach a broader population. Monica Yudron, Jason Sachs, and I considered two research questions in relation to the expansion: (1) Does implementing the Boston model in community-based centers improve instructional quality? and (2) Are there practical barriers to successful implementation that could be addressed in future scale-up efforts?

Did instructional quality improve?

We found that instructional quality with respect to language and literacy did increase, but these gains were not fully sustained through the two-and-a-half-year pilot period. For math instruction, there was little change in quality over the pilot period. We also found that neither language nor math instructional quality reached the level provided by the school-based sites, though for language and literacy the gap between the two did decrease over the study period. The quality of emotional support, classroom organization, and instructional support also fell short of that provided at the school-based sites.

One of the challenges encountered in scaling up the program was that adherence to the provided curricula was low to moderate, with three classrooms implementing at a high level, seven at a medium level, and four at a low level. In particular, although full implementation of the curricula requires about three-and-a-half hours of instructional time per day, on average only 80 minutes of the community-based centers' core three-hour morning instructional time (44 percent of the available time used for instruction equaling about 38 percent of the required amount of time) was spent on instruction. This reflects the fact that in public schools, instruction begins at a specific time every day because all children are required to be present at the beginning of the school day, but in community-based centers drop-off times vary, and instruction generally begins only when the majority of students have arrived.

What are the barriers to implementation?

Interviews with teachers and directors from the pilot sites suggested several ways that implementation was undermined. For example, teachers wanted to maintain the previous curriculum and this took away from the time available to implement the new curricula. Also, opportunities for teachers to plan and work together to implement the needed changes were limited. In public schools, teachers are provided some common planning time by having other staff monitor lunch periods or provide nonacademic instruction; this structure did not exist in most of the community based-centers. The lack of common planning time interfered with centers' ability to schedule coaching sessions and made it more challenging for teachers to collaborate on implementing the new curricula.

Retention over the pilot period was 71 percent for teachers and 60 percent for directors. While some of this turnover occurred because teachers were inspired to pursue a master's degree, the larger problem was that when staff

left, few qualified staff applied, and open positions were often not filled for many months. While the intention of the support and training provided to community-based center directors as part of the pilot was for them to serve as instructional leaders, this often did not occur. Again, the lack of infrastructure common in public schools meant that directors often had to attend to an array of time-sensitive administrative and maintenance needs rather than being able to provide instructional leadership.

The public school sites also had access to on-site special education services that community-based centers generally did not have, making it harder for teachers to effectively deal with challenging child behaviors. Finally, mixed-age classrooms provided a significant challenge; community-based sites included three-year-olds in their prekindergarten classrooms in order to stay financially viable, although the Boston program model was developed for four-year-olds. This issue was exacerbated by children sometimes being moved up to the older class before their third birthday, because of higher demand for spots in the younger-child classrooms. Having such a wide age range in one classroom often made it challenging to provide quality instruction to all children.

We looked at how the presence or absence of these barriers were correlated with instructional quality. We found that having a stable teaching team and the same director over the entire pilot period was positively associated with instructional quality, while the presence of three-year-olds and teachers' reluctance to give up the old curriculum were negatively associated with quality.

Advantages of community-based preschools

Although we did identify numerous barriers to implementation in community-based preschools, we also found that those sites had some advantages. Because the pilot sites, unlike public schools, did not provide any transportation to the sites, staff had more contact with parents, so teachers at the pilot sites were more likely to receive information about issues at home that might affect children in the classroom. Although pilot sites were often unsuccessful at providing the required amount of instructional time, the fact that children are present up to 9 hours a day in community-based centers compared to 6.5 hours in the public schools means there are opportunities to restructure the schedule to increase instruction. Community-based preschools also tended to do a better job of meeting families' childcare needs, since they provide year-round care. Finally, the family-style meals provided at many community-based centers offer children opportunities to participate in conversations and build oral language skills that are generally not available in the public schools.

Policy implications

Although this study has a small sample size, no control group, and was located in a single metropolitan area, we do find some useful directions for both future research and further program expansion efforts. First, the literature currently offers little concrete guidance about the trade-offs associated with different types of prekindergarten sites. Second, the concerns about having a two-tiered system with disparate levels of resources are borne out by our findings, as, for example, the community-based day care centers often had positions unfilled for many months. Third, it appears that instructional quality gains can be undermined by a lack of structural supports, so thought must go into making sure sites have what is needed to successfully carry out a program. Fourth, mixed-age classrooms need to be implemented thoughtfully; while approaches such as Montessori have an intentional theory about why classrooms are mixed-age, other programs are mixing ages primarily for financial reasons, and in ways that can negatively affect the learning environment. Finally, the large number of issues that have arisen in this small study underlines the wisdom of undertaking pilots prior to large-scale implementation. As Boston continues to scale up their prekindergarten program into community-based programs, they will be able to make changes in response to our findings; for example, a new rule has already been implemented to strictly limit the proportion of three-year-olds in a participating preschool classroom.

The two major policy questions remaining are: how to move programs into smarter curriculum and professional development choices; and how to capitalize on the strengths of community-based organizations and avoid the pitfalls.■

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