Health Disparities and Gaps in School Readiness

Janet Currie

Summary

The author documents pervasive racial disparities in the health of American children and analyzes how and how much those disparities contribute to racial gaps in school readiness. She explores a broad sample of health problems common to U.S. children, such as attention deficit hyperactivity disorder, asthma, and lead poisoning, as well as maternal health problems and health-related behaviors that affect children's behavioral and cognitive readiness for school.

If a health problem is to affect the readiness gap, it must affect many children, it must be linked to academic performance or behavior problems, and it must show a racial disparity either in its prevalence or in its effects. The author focuses not only on the black-white gap in health status but also on the poor-nonpoor gap because black children tend to be poorer than white children.

The health conditions Currie considers seriously impair cognitive skills and behavior in individual children. But most explain little of the overall racial gap in school readiness. Still, the cumulative effect of health differentials summed over all conditions is significant. Currie's rough calculation is that racial differences in health conditions and in maternal health and behaviors together may account for as much as a quarter of the racial gap in school readiness.

Currie scrutinizes several policy steps to lessen racial and socioeconomic disparities in children's health and to begin to close the readiness gap. Increasing poor children's eligibility for Medicaid and state child health insurance is unlikely to be effective because most poor children are already eligible for public insurance. The problem is that many are not enrolled. Even increasing enrollment may not work: socioeconomic disparities in health persist in Canada and the United Kingdom despite universal public health insurance. The author finds more promise in strengthening early childhood programs with a built-in health component, like Head Start; family-based services and home visiting programs; and WIC, the federal nutrition program for women, infants, and small children. In all three, trained staff can help parents get ongoing care for their children.

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Every parent knows that a small child sick with an earache may not sit still to listen to a story, indeed may not listen at all, until she recovers. For some chronically ill children, the struggle to achieve academically may go on throughout childhood. This article explores some of the health conditions most common to American children, notes racial disparities in the health of children, and asks how much disparities in children's health might contribute to the racial gap in school readiness. Given the growing recognition that school readiness encompasses behavior as well as cognitive abilities, I highlight the effects of health on both domains.

Health problems can affect a child's school readiness both directly and indirectly. Lead poisoning, for example, directly impairs a child's cognition and causes behavior problems. Poor health can also affect readiness indirectly by crowding out beneficial activities and changing the way the family treats a child. For example, parents who perceive a child as frail or vulnerable may be overly protective. They may coddle or inadequately discipline the child or may discourage him or her from engaging in activities that could hone both academic and social skills. Maternal health conditions and health-related behaviors may also have consequences for a child's school readiness.

Clearly, health conditions can impair school readiness in individual children. Whether racial health differences are responsible for a large fraction of the black-white gap in school readiness is a more complex question. For health problems to affect the gap, three conditions must hold. First, the health problem must affect many children. Severe illnesses like childhood cancer are mercifully rare and thus cannot explain the overall readiness gap between black and white children. Second, there must be a link between the health condition in question and academic performance or behavior problems. Health disparities that do not affect children's academic achievement or behavior cannot contribute to gaps in achievement or behavior. Third, there must be a racial gap either in the prevalence of the health problem or in its effects.

These same considerations have guided my choice of which health problems to address. Because space constraints make it impossible to discuss the possible contribution of every health condition, let alone every type of health behavior, I focus on health conditions and behaviors that affect many children or that affect children in some racial groups much more than in others. I also focus on health conditions whose connection with school readiness has been documented by research. Racial disparities in childhood injuries, for example, are large, but little research links these gaps to school readiness. Finally, I focus on five broad health domains: mental health conditions, chronic conditions, environmental threats, nutrition, and maternal health and behaviors. Within those domains, the specific topics are attention deficit hyperactivity disorder (ADHD), asthma, lead poisoning, anemia and iron deficiency, breastfeeding, and maternal depression. I consider maternal health and behaviors because they may have larger effects on racial disparities in school readiness than do most of the children's health conditions.

Within each area, I highlight studies based on large samples and good research designs. I focus on black-white and poor-nonpoor gaps in health status because most studies of disparities in health discuss these contrasts. Poor-nonpoor gaps are relevant because

black children tend to be poorer than nonblack children. In 2002, for example, 37.5 percent of black children under the age of five were poor, compared with 15.5 percent of white children.[1]

Although some of the specific health conditions considered here have large effects on children's cognitive skills and behavior, most explain little of the overall racial gap in school readiness. Still, the total cumulative effect of health differentials summed over all conditions is significant. "Back-of-the-envelope" calculations indicate that racial differences in health conditions and in maternal health and behaviors together may account for as much as a quarter of the racial gap in school readiness.

Health Conditions and School Readiness

This section considers several specific types of health problems including child mental health problems, chronic physical conditions, environmental hazards, and poor nutrition. The impact of maternal health conditions and behaviors is considered in the next section.

Child Mental Health Problems

According to the 1999 U.S. surgeon general's report, approximately one in five children and adolescents in the United States has symptoms of mental or behavioral disorders. Attention deficit hyperactivity disorder, the most commonly diagnosed chronic mental health problem among young children, is the focus of this section. The disorder is characterized by an inability to pay attention (inattention) or by hyperactivity, or both.[2]

Children with ADHD are not school ready, almost by definition. They have great difficulty with basic tasks such as sitting still and listening to instructions. They are likely to be disruptive and to have trouble getting along with other children because, for example, they constantly interrupt and have trouble taking turns. The disorder is also often linked with cognitive impairments.

A diagnosis of ADHD has three main criteria. Six or more symptoms of inattention or of hyperactivity must persist for at least six months to a degree that is maladaptive and inconsistent with the child's developmental level. Some of the symptoms must be present before the child reaches the age of seven. And impairment from the symptom must be evident in two or more settings, such as home and school. This last criterion means that teachers are often important for the diagnosis of ADHD.[3]

Assessing the prevalence of ADHD is complicated. Most studies of its prevalence are based on diagnosed cases, but considerable controversy exists over whether the disorder is over- (or under-) diagnosed. Data from the National Institute of Mental Health's Epidemiology of Child and Adolescent Mental Health Disorders (MECA) study of 1,285 youths aged nine through seventeen indicate that 5.1 percent of the children had ADHD. A study of 21,065 children aged four to fifteen recruited from 401 family medical practices found that 9.2 percent had "attention deficit-hyperactivity problems" according to their clinician, but that the clinicians did not generally use standard diagnostic criteria.[4]

According to the hyperactivity subscale of the Strengths and Difficulties Questionnaire of the National Health Interview Survey, 4.19 percent of boys and 1.77 percent of girls have "clinically significant" ADHD symptoms. Among boys, the prevalence is highest among blacks, at 5.65 percent, as against 4.33 percent for whites and 3.06 percent for Hispanics. Prevalence is also higher (6.52 percent)

in families with incomes less than $20,000 than in families with higher incomes (3.85 percent). When gender, race, age, income, and parental education are taken into account, the effect of income remains statistically significant, but there is no difference in prevalence between blacks and whites.[5]

Although drug therapy improves behavior for approximately 70 to 80 percent of ADHD children, the evidence that treatment affects academic performance is much less conclusive.[6] Treatment differs widely by race and income. Data from the National Health Interview Survey indicate that the share of parents who had ever been told that their child had ADHD was 7.5 percent for whites, 5.7 percent for blacks, and 3.5 percent for Hispanics. For poor children the rates were 7.1 percent as against 6.6 percent for nonpoor children. According to the 1997 Medical Expenditure Panel, 4.4 percent of whites but only 1.7 percent of blacks were treated for ADHD, though the probability of receiving treatment varied little by income. In a Maryland study of Medicaid patients, blacks were less than half as likely to have been prescribed psychotropic drugs as whites were, indicating that even among children with similar insurance coverage, treatment patterns differ by race.[7]

Teachers were most likely to believe that white males had ADHD and least likely to think that white females had the disorder, with black students falling in between.

In one study, teachers were given profiles of students and asked whether they had ADHD. The race and gender assigned to the profiles were randomly varied. Teachers were most likely to believe that white males had ADHD and least likely to think that white females had the disorder, with black students falling in between. A study based on random telephone interviews found that in a sample of 381 high-risk children, 91 percent of the white parents and 85 percent of the black parents believed that their child had a problem. Fifty-one percent of the white children had been evaluated for ADHD as against only 28 percent of the black children. Rates of treatment were 31 percent for whites and 15 percent for blacks. Following up on children who were diagnosed but not treated, the researchers found that blacks were more likely than whites to cite negative expectations about the treatment (58 percent versus 34 percent), stigma (47 percent versus 32 percent), and financial constraints (32 percent versus 15 percent).[8]

Using survey data that followed a group of children from the United States and Canada, Mark Stabile and I show that children with ADHD not only perform more poorly than children without the disorder on cognitive tests, but also are at greater risk of having to repeat a grade and to enroll in special education, even after controlling for a wide range of potential confounders. ADHD affects cognition and behavior more than other chronic health conditions, such as asthma, or poor health generally. Our estimates imply that children with ADHD score at least a quarter of a standard deviation lower on standardized tests of mathematics and reading than other children. Surprisingly, the effect of ADHD on cognitive and scholastic outcomes is not strongly related to income in either country.[9]

How much of the racial gap in school readiness might be accounted for by ADHD? Suppose that a generic test has a mean of 50 and a standard deviation of 15 and that black children tend to score at least a half a standard deviation (8 points) lower than white children on this test. The studies discussed above suggest that ADHD lowers test scores by about a third of a standard deviation (5 points) and that about 4 percent of whites have the disorder, compared with 6 percent of blacks. Hence, if the difference in the prevalence of ADHD were the only difference between the black and white children, one would expect the average test score of a sample of white children to be 49.8, while the average test score of a sample of black children would be 49.[10]

This estimate, though crude, makes clear that the mean test scores of blacks and whites are driven by children who do not have any health conditions. That being so, any given health condition would have to have quite a large effect (or a very different prevalence for whites and blacks) before it could have much effect on mean differences in test scores.

Chronic Physical Health Conditions

Poor children are more likely than better-off children to suffer from a wide array of chronic health problems, particularly severe conditions such as mental retardation, heart problems, poor hearing, and digestive disorders. Chronic conditions affect school readiness in various ways. First, illness may simply crowd out other activities with doctor visits and treatment. Second, children with chronic conditions may experience more stress, fatigue, or pain that can interfere with cognitive development. Third, drugs used to treat some illnesses may have unanticipated effects. Fourth, illness may alter relations between children, parents, and others in a way harmful to the child's development. Fifth, illnesses directly affect the ability to learn, by altering body chemistry.[11]

This section focuses on asthma. Not only is asthma one of the most common chronic conditions among children, but it is also the subject of much research focused both on black-white gaps in prevalence and on the relationship between asthma and measures of cognitive achievement and behavior.

Asthma is the leading cause of children's trips to the emergency room, of their being hospitalized, and of their being absent from school. An "asthmatic" child is one who has had an episode of blocked airways or who has a tendency toward such episodes. Doctors use different methods to diagnose asthma, and diagnosis depends on the child's either having an episode or being treated for breathing or wheezing problems. Children whose asthma is adequately managed should not have acute attacks. Prevalence surveys that focus on doctor diagnoses and those that focus on asthma attacks, therefore, lead to very different estimates.

According to the 2001 National Health Interview Survey (NHIS), 13 percent of children under age eighteen have been diagnosed with asthma, and 6 percent have had an asthma attack in the past twelve months. Prevalence rates in diagnosed asthma are higher for blacks (15.7 percent) than for whites (12.2 percent) but lowest for Hispanics (11.2 percent). Rates are also higher for poor children (15.8 percent) than nonpoor children (12 percent). Among black children, 7.7 percent had an attack in the past twelve months, as against 5.7 percent of whites and only 4 percent of Hispanics.[12]

The NHIS further shows that 1.6 percent of white children under age eighteen, and

Common Chronic Childhood Conditions

Three common chronic conditions—dental caries, allergies, and ear infections—are potentially implicated in cognitive and behavior problems in children, but research is not yet far enough along to make it possible to estimate how large those effects might be.

Dental caries (tooth decay) is the most common childhood chronic condition. Chronic pain from dental disease can affect both children's cognitive attainment and their behavior. According to the Centers for Disease Control, poor children have almost twelve times more restricted-activity days because of dental problems than do higher-income children, and untreated dental disease can lead to problems of eating, speaking, and learning. It is, however, difficult to get estimates of the size of these effects.[1]

Not only is tooth decay extremely common, but it also affect blacks more than whites, so that if it does significantly affect children's learning and behavior, then it could contribute to disparities in school readiness. White, black, and Hispanic children have about the same number of decayed, missing, or filled teeth, suggesting that the rates of tooth decay are similar. But among two- to five-year-old children, 14.4 percent of white children have untreated dental caries, as against 25.1 percent for black children and 34.9 percent for Hispanic children.[2]

Allergies are also extremely common. According to the 2002 National Health Interview Survey, 10.3 percent of children have hay fever, 12.3 percent have respiratory allergies, and 11.3 percent have other allergies. (These categories are not mutually exclusive, so the share of children with any allergy is less than the sum of these percentages.) Assessing the prevalence of allergies is complicated because of serious reporting problems. For example, the probability that a parent reports an allergy increases with income and education; it is lower for blacks than for whites even though asthma, which is often associated with allergies, is much more common among blacks. Given these problems, and the fact that allergies may range from mild to life threatening, it is difficult to say how much of the gap in school readiness might be attributable to allergies.[3]

Ear infections (otitis media) affect most young children at one time or another and are the most common reason why children visit a doctor. Like dental caries, they can be extremely painful, though more than 80 percent of infections resolve themselves within three days if untreated. Among children who have had acute otitis media, almost half have persistent effusion after one month, a condition that can cause hearing loss. Researchers estimate that at any given time roughly 5 percent of two- to four-year-old children have hearing loss because of middle ear effusion lasting three months or longer. And hearing loss can delay language development. But the prevalence of ear infections does not appear to differ between blacks and whites, which suggests that otitis media cannot be responsible for gaps in school readiness.[4]

1. Centers for Disease Control, *Preventing Chronic Diseases: Investing Wisely in Health, Preventing Dental Caries* (U.S. Department of Health and Human Services, April 6, 2004).

2. Linda M. Kaste and others, "Coronal Caries in the Primary and Permanent Dentition of Children and Adolescents Ages 1 to 17 Years: United States, 1988–1991," *Journal of Dental Research* 75 (February 1996): 631–41.

3. Achintya N. Dey and others, *Summary Health Statistics for U.S. Children: National Health Interview Survey, 2002*, Vital Health Statistics Series 10, no. 221 (Hyattsville, Md.: National Center for Health Statistics, March 2004).

4. Paddy O'Neill, "Acute Otitis Media," *British Medical Journal* (September 25, 1999); Richard Thrasher and Gregory Allen, *Ear, Otitis Media with Effusion* (www.emedicine.com/ENT/topic209.htm [December 13, 2002]).

5.7 percent of black children, had been hospitalized for asthma between 1998 and 1999. The disparity in hospitalizations is much greater than that in the number of attacks, suggesting that black children's asthma is either much more serious or much less likely to be controlled. This conclusion is supported by the finding that blacks were more likely than whites to have their activity limited because of asthma (32.7 percent compared with 21.4 percent). Similar disparities in morbidity were noted between poor and nonpoor children (33.2 percent vs. 20.8 percent), but poor black children were most likely to have activity limited because of asthma (49 percent as against about 20 percent for nonpoor black or white children or for poor white children).[13]

Consistent with these observations, several smaller-scale studies have noted that doctors are less likely to prescribe inhaled anti-inflammatory drugs for minorities than for whites. One study using nationally representative data from the National Health and Nutrition Examination Survey (NHANES) III focuses on children with moderate to severe asthma (defined as having been hospitalized or having two or more acute attacks or three or more episodes of wheezing over the past year) and finds that only 26 percent of these children were taking maintenance medication. In this group, children who have Medicaid insurance and who speak Spanish are more likely to be inadequately medicated for asthma. Race is not an independent factor.[14]

Many research papers suggest, perhaps surprisingly, that asthma has little effect on cognitive outcomes or schooling attainment. Most such studies, however, examine children whose asthma is well controlled. Indeed, the purpose of such studies is to see whether the medication children take to control their asthma affects their cognitive functioning. But several studies indicate that children with asthma are more likely than other children to have behavior problems, even when the asthma is controlled. For example, one study found that asthmatic children scored between two-thirds to one standard deviation below the normative value on a test of impulse control, while another found that asthma doubled the risk of behavioral problems. These changes in behavior may reflect relatively subtle effects of childhood illness on parenting and family functioning.[15]

One large population-based study using NHIS data found that asthma affected school absences, the probability of having learning disabilities, and grade repetition. Asthmatic children in grades one to twelve were absent from school an average of 7.6 days a year as against 2.5 days for well children. Nine percent of the asthmatic children (5 percent of the well children) had learning disabilities; 18 percent (15 percent of the well children) repeated a grade.[16]

In the only study to examine school readiness explicitly, Jennifer Halterman and her collaborators examine 1,058 children entering kindergarten in urban Rochester and find that asthmatic children had lower scores on a test of school readiness skills and that their parents were three times more likely to report that they needed extra help with learning. Tests of language, motor, and socioemotional skills showed no differences. The negative effects were concentrated among a group of children whose asthma was severe enough to limit their activity (suggesting that it was not adequately controlled), a group more likely to include boys than girls.[17]

One difficulty in interpreting all these studies is that because asthma is most prevalent among poor and minority children, the ap-

parent effect of asthma on academic performance and behavior could reflect omitted third factors. But several studies of homogeneous groups of children also find differences in behavior, suggesting that asthma probably does have a causal effect at least on behavior problems and hence on school readiness.

A back-of-the-envelope calculation similar to that for ADHD can help determine whether these differences are large enough to affect the mean test score gap. The studies discussed above suggest that some 5 percent of black children, but only 3 percent of white children, have asthma severe enough to limit their activity. The major effect of asthma is on behavior, so I will assume that asthmatic children score a standard deviation higher on a behavior-problem index than do nonasthmatic children and that the index has the same characteristics as the generic test score assumed above (that is, mean of 50, standard deviation of 15, average black-white difference of 8). Under these assumptions, the average behavior-problem score among blacks would be 50.4; that among whites, 50.2. Again, although asthma has important effects on individual children, it cannot account for much of the racial gap in measures of school readiness.[18]

Environmental Exposures to Hazardous Substances

The literature on asthma strongly suggests that its greater prevalence among impoverished children could be due in part to characteristics of their housing. The degree of segregation by race, ethnicity, and income in American cities suggests that some groups are more likely than others to be exposed to environmental hazards. Moreover, to the extent that known environmental hazards are capitalized into housing prices, pollution will lower rents, making hazardous areas more attractive to poor people than to rich ones. Conversely, low land prices in poor neighborhoods may draw in new hazards. One environmental hazard whose effect on children's health has been studied extensively is lead.

Lead has long been known to be toxic. Blood lead levels above 45 micrograms per deciliter (microg/dl) can cause damage to the central nervous system and even death. For many years, the Centers for Disease Control set 30 microg/dl as the threshold "level of concern" for lead poisoning. But in response to evidence that levels as low as 10 microg/dl could affect children's cognitive functioning and behavior, the CDC lowered the threshold to 25 microg/dl in 1985 and to 10 microg/dl in 1991. Controversy now centers on whether even lower levels of lead endanger children, who are generally at higher risk from lead than adults. In adults only organic lead compounds can breach the blood-brain barrier; in children, both organic and inorganic lead can penetrate that barrier. And children who have diets deficient in calcium, iron, and zinc tend to absorb more lead.[19]

Before the federal government began to regulate lead, children were exposed to it in paints, in drinking water (from lead solder in pipes), in gasoline, and in canned food. According to the NHANES surveys, 88.2 percent of children aged one to five had lead levels above 10 microg/dl during 1976–80. That share plummeted to 8.6 percent during 1988–91 and fell further to 2.2 percent during 1999–2000—figures that imply that the number of children with unsafe lead levels fell from 13.5 million to less than half a million over this period.[20]

Still, lead remains in the soil, in paint in older homes, and in pipes. Some states still have lead "hot spots." One study reported that 68

percent of children attending a pediatric clinic in inner-city Philadelphia had unsafe levels of lead in their blood. Poor and black children are more likely than others to have unsafe levels.[21]

The NHANES data from 1999–2000 and data from state surveillance systems indicate that 60 percent of one- to five-year-old children with confirmed elevated blood lead levels between 1997 and 2001 were black, indicating a much higher prevalence among blacks than among whites. In 2001, 2 percent of white children and 8.7 percent of black children had confirmed high blood lead levels. The condition affects more boys than girls. In 2001, for example, 40,000 boys and 33,000 girls were confirmed to have high levels.[22]

Although some studies have found that increasing blood lead levels from 10 to 20 microg/dl reduces IQ scores by as much as 7 points (where one standard deviation is about 15 points), two reviews of many studies of blood lead levels conclude that such an increase would reduce IQ by about 2 points. Elevated lead levels have also been linked to hyperactivity and behavior problems, most famously by Herbert Needleman, who argues that lead exposure causes criminal behavior. In his study, a sample of delinquents was four times more likely to have high bone lead levels than a group of matched controls. But because lead exposure is increasingly strongly correlated with minority status, poverty, and residence in decaying older neighborhoods, it is possible that at least some of the observed correlations between lead levels and negative outcomes reflect omitted third factors. These estimates of the effects of low-level lead exposure should thus be regarded as upper bounds.[23]

A calculation similar to those made for ADHD and asthma suggests that differing exposure to lead might be responsible for 0.2 point of the average eight-point racial gap in scores assumed above. If racial disparities in exposure to other environmental hazards have also grown, exposure to such hazards could be an increasingly important cause of disparities in school readiness.[24]

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Nutrition

U.S. food and nutrition programs were created to ensure that children and other vulnerable people would get enough to eat. Only recently have researchers and policymakers begun to recognize that many if not most children eat too much of the wrong things and that obesity is a greater threat to child health than insufficient calories. In fact, children at risk of missing meals (those who are "food insecure") are more likely to be obese than other children, although they are also more likely to be lacking specific micronutrients. Similarly, poor children from birth to age five are twice as likely as better-off children to be obese, about a third more likely to be anemic, and about 20 percent more likely to be deficient in vitamin A. It is possible that many micronutrients will be found to affect cognitive development among young children. But because most research

to date on the effects of nutrition on cognition has focused on iron-deficiency anemia, that will be the focus of this section.[25]

Among its many negative effects on health, iron deficiency impairs immune function, cognitive functioning, and energy metabolism. Clinically, iron deficiency is defined as having an abnormal value on at least two out of three laboratory tests of iron status. Anemia, a more severe condition, is defined as iron deficiency plus low hemoglobin.

If iron deficiency impairs cognitive functioning, it could well be responsible for part of the test score disparities between blacks and whites and between poor and nonpoor children.

When infants are about four months old, they begin to deplete the stores of iron with which they are born. The widespread use of iron-fortified infant formula and cereals has made anemia much less of a problem in infants under one year. But toddlers may stop eating these iron-fortified infant foods before they begin to gain adequate iron from their diet.

According to the NHANES III, 9 percent of toddlers are iron deficient, as against 3 percent of three- to five-year-olds and 2 percent of six- to eleven-year-olds. Only 3 percent of toddlers are anemic, and less than 1 percent of children aged three to eleven are anemic. The NHANES 1999–2000 yields similar estimates. These anemia rates are down considerably from 15–30 percent in the late 1970s and early 1980s, a decline variously attributed to iron-fortified foods and the growth of the Special Supplemental Nutrition Program for Woman, Infants, and Children (WIC), a federal program that offers food supplements to pregnant, lactating, and postpartum mothers, infants, and children younger than five.[26]

Iron deficiency is much more common among poor and black children than among other children. Twice as many black children as white children are iron deficient (16 percent versus 8 percent for toddlers), while poor children are more than 50 percent more likely to be deficient than nonpoor children. If iron deficiency impairs cognitive functioning, it could well be responsible for part of the test score disparities between blacks and whites and between poor and nonpoor children.

Sally Grantham-McGregor and Cornelius Ani reviewed observational studies that followed a group of children over time and found that conditional on measures of social background, gender, and birth weight, low hemoglobin levels in children aged two or younger are strongly linked to poor schooling achievement, cognitive development, and motor development in middle childhood. These studies, however, do not establish a causal relationship, given the strong association between iron deficiency and other factors that could affect development, such as poverty.[27]

Grantham-McGregor and Ani also survey studies of trials in which anemic or iron-deficient children were given iron supplements. They find that giving anemic children iron supplements for two to six months improves cognitive functioning, although not enough to allow school-age children to catch up to their non-anemic peers. Five small-

scale studies (four in developing countries) that investigated the effect of iron supplementation on iron-deficient non-anemic children found little evidence of an effect on cognition, but it is possible that subtle effects of improving iron status in these samples of children without anemia might be detectable in larger samples.

In short, although the higher rates of iron deficiency among poor and minority children are a cause for concern, little concrete evidence links these disparities to gaps in cognitive outcomes or schooling attainment. Anemia itself, which has been more definitively linked to cognitive deficits and poorer schooling attainment, has become relatively rare, even among disadvantaged children. Although anemia may have contributed to the readiness gap in the past, it is unlikely to be a major contributor today.

The Importance of Maternal Health Conditions and Behaviors

In this section I focus on two aspects of maternal health conditions and behaviors that significantly affect children's cognitive and social functioning and that are also characterized by large racial disparities. Because many other maternal health behaviors could be considered, my purpose here is merely to illustrate how potentially important maternal behaviors can be.

Breast Feeding

The first behavior, breast feeding, exhibits large disparities by race. The American Academy of Pediatrics recommends that infants be breast fed exclusively for their first six months and that cow's milk not be introduced until after the first birthday. Some 70 percent of white infants, but only 40 percent of black infants, have ever been breast fed. At six months, 29 percent of white infants, but only 9 percent of black infants, are still being breast fed.[28]

Theoretically, breast feeding affects a child's cognitive development through three channels. First, it prevents diseases such as ear infections and may even prevent asthma. To the extent that poor physical health impairs children's performance, a lack of breast feeding could thus be implicated. Second, breast feeding provides nutrients, such as long-chain fatty acids that may affect infants' brain development, that are not adequately provided in most infant formula sold in the United States. Third, breast feeding may promote maternal-infant bonding that may, in turn, be beneficial for learning. Many studies link breast feeding positively with cognitive skills. Typically they find IQ gains of two to five points for healthy infants and up to eight points for low birth weight babies. Once again, however, given the strong relationship between breast feeding and various measures of socioeconomic status, it is unclear whether the association between breast feeding and cognition is causal.[29]

If, however, breast feeding does affect IQ scores, then the racial differences in prevalence are large enough to explain a significant part of the gap in the generic test score that I have been considering. Suppose, for example, that breast feeding for six months raises IQ by five points, or about one-third of a standard deviation. Then the fact that 29 percent of white infants, but only 9 percent of black infants, are breast fed for six months would generate a one point difference in average scores (with the assumed black-white gap being eight points).[30]

Maternal Depression

Although my emphasis in this article has been on child health, the mental health of

the mother may be a key determinant of the health of the child. The difficulties associated with poverty or racism, or both, may leave some mothers more vulnerable to depression, and depressed mothers may be less able than healthy mothers to provide a stimulating and nurturing environment for their children. The hypothesis that differences in rates of maternal depression could be associated with group-level differences in the attainments of children, however, has not been directly tested, so it is necessary to go through each link in the causal chain.

Evidence abounds that poverty is associated with a higher risk of depression. The poor are 2.3 times more likely to be depressed than the nonpoor, adjusting for age, gender, ethnicity, and prior history of depression. This higher risk may be due both to heightened stress and to a lack of resources to cope with that stress. The incidence of pregnancy and postpartum depression in a sample of poor, inner-city women is about one-quarter, double the rate typically found among middle-class women. In the Infant Health and Development Study, 28 percent of poor mothers, as against 17 percent of nonpoor mothers, were depressed.[31]

Given that blacks are generally poorer than whites, one might expect a higher prevalence of depression among black mothers than among white mothers. But research findings are mixed. Some studies have shown higher rates of depressive symptoms among blacks than whites, but studies that use the diagnostic criteria for major depression generally find little racial difference in incidence. The National Comorbidity Study and Epidemiological Catchment Area Studies found that blacks were less likely than whites to be depressed, whereas another study found no racial difference in the incidence of depression in a sample of poor women. These findings suggest that although poor mothers may be at higher risk than others, race does not play an independent role in explaining the incidence of maternal depression. It is possible that both race and socioeconomic status affect whether, and how effectively, women are treated for depression, but there is little hard evidence that race, per se, is a factor.[32]

Studies of the relationship between maternal depression and child development can be divided into several groups. First, observational studies of the way depressed mothers interact with their infants find that they are often inconsistent and ineffective in disciplining their children, more likely to use force rather than compromise, and less likely to interact in a positive way. These problems are more apparent among impoverished mothers with depression than among their better-off counterparts. Second, many studies document a relationship between maternal depression and both current and future child behavior problems, insecure attachment, and cognitive problems. Maternal depression, they find, can reduce test scores by about a third of a standard deviation among preschool children.[33]

It is not clear that maternal depression *causes* these negative outcomes: the link between the two could also reflect shared genes or a shared response of the mother and child to other external causes. It is also unclear how pervasive or persistent child responses to maternal depression are. Several studies, for example, find the effects of postpartum depression confined to boys.[34]

With 37.5 percent of black children under five and 15.5 percent of white children in that same age group living in poverty, the socioeconomic gap in the incidence of maternal depression noted above—28 percent among

the poor, 17 percent among the nonpoor—means that maternal depression will affect some 11 percent of black preschool children but only 3 percent of white preschool children. These differing exposures to maternal depression could account for a half a point of the assumed eight-point gap in our generic average test score.[35]

Potential Policy Responses

Potential policy responses considered here include measures aimed at reducing disparities in access to health care, early intervention programs, family services, and WIC (the Supplemental Nutrition Program for Women, Infants, and Children).

Reducing Disparities in Access to Health Care

Disadvantaged children are not only more likely than better-off children to have particular health conditions, they are also less likely to be treated for them. Could differences in access to care be responsible for differences in use of care? Although lack of insurance coverage remains a serious problem for many children, past expansions of public health insurance under Medicaid and the State Children's Health Insurance Program (SCHIP) mean that most poor and near-poor children are already eligible for public health insurance. This journal devoted its spring 2003 issue to a discussion of health insurance for children and concluded that "programs already in place have the potential to virtually eliminate uninsurance among low-income children."[36]

Making more children eligible for care is unlikely to reduce health disparities greatly because the most disadvantaged children are already eligible (though reductions in eligibility in many states could undo recent progress). More to the point, many eligible children are not signed up for public health insurance until they have an urgent medical problem. Thus they do not get preventive care. A Medicaid-*eligible* child suffering an asthma attack will be treated, but if she is not *enrolled*, she may not receive the monitoring and medication needed to prevent another attack. The children with the poorest access to specialists are those in families with incomes between 125 percent and 200 percent of poverty, even though many are eligible for SCHIP.[37]

Although lack of insurance coverage remains a serious problem for many children, past expansions of public health insurance mean that most poor and near-poor children are already eligible for public health insurance.

One way to improve access to care among children eligible for public health insurance may be to make it easier to sign up for, and to maintain, Medicaid coverage. When Jeffrey Grogger and I examined several state efforts to streamline the Medicaid application process, such as shortening application forms and allowing mail-in applications, we found little evidence that they were effective. By contrast, Anna Aizer found that paying community organizations to help families sign up for public health insurance in California increased enrollments among Hispanic and Asian families and reduced preventable hospitalizations. Because take-up of social programs is highest when enrollment is automatic, the best approach to the problem of eligible, unenrolled children may be to make

all children eligible for Medicaid services and charge premiums on a sliding scale.[38]

But further expanding public health insurance is unlikely ever to eliminate all socioeconomic disparities in health. The famous 1980 Black report in Great Britain concluded that links between socioeconomic status and health became more pronounced following the advent of national health insurance in 1948—although it is possible that the socioeconomic gap would have widened even further in the absence of the National Health Service. Moreover, despite universal take-up of national health insurance in Britain, the rich receive more services than the poor, conditional on their health status. Health is also linked to household income in Canada, even though Canadians have universal health insurance.[39]

A final consideration is that health care providers are not always trained to offer the services that children and their mothers require. A recent study found that pediatricians rarely recognized depressive symptoms in most mothers, suggesting that increasing access to these providers would not necessarily help children whose problems were linked to maternal depression.[40]

Early Childhood Intervention Programs

Most early intervention programs include a significant health component, in the belief that they cannot address educational needs without also addressing health problems. Because many different children's programs already address specific health problems (for example, by screening for lead poisoning or by focusing on child nutrition), it may seem irrational to make health a major focus of educationally oriented early intervention programs. But to take advantage of existing health programs, parents must be knowledgeable and tireless advocates for their children. And parents who are struggling to put bread on the table may not have the time or energy to get all the services their children need. Hence the potential value of quality infant and preschool programs that offer "one-stop shopping" for these services. Staff members in such programs may be better than parents at spotting problems and also more knowledgeable about community resources. But researchers have not yet systematically assessed the importance and effectiveness of the health services component of early intervention programs.[41]

Head Start, the federal program serving disadvantaged three- to five-year-old children, mandates that children receive the health assessments and services that they need. A 1984 Abt Associates study, now quite dated, randomly assigned children in four sites to Head Start treatments and non–Head Start controls and evaluated the health services the children received. The children entering Head Start had many and serious health problems. They had an average of 4.6 unfilled cavities; 34 percent scored below the 10th percentile for fine and gross motor skills for their age; 63 percent had a speech or language problem; and one-third failed the hearing test. Fourteen percent had active otitis media.[42]

Although the Abt study found that compliance with Head Start health performance standards was imperfect, the Head Start children were significantly more likely than the control children to have received medical screenings and necessary services. It is also worth stressing that Head Start has detailed performance standards for health services and that programs are regularly evaluated with respect to indicators such as the fraction of children who have received dental examinations, hearing and vision screenings, and immunizations.

Using data from Head Start budgets and from the National Longitudinal Survey of Youth, Matthew Neidell and I found that Head Start programs that spend a larger share of their budgets on health and education raise future child test scores more than do programs that spend higher shares on other types of programming, such as programs for parents.[43]

Given the large socioeconomic disparities in health in the United States, it may well be that the health services offered by early intervention programs play an important role in improving the cognitive functioning and future schooling attainments of impoverished children. The programs do not seem to duplicate services, but rather to help children get the services for which they are eligible through other programs.

Family-Based Services

Offering health services through programs such as Head Start will not reach all needy children, both because not all eligible children enroll and because not all needy children are eligible. Home visiting programs and other family-centered programs offer an alternative model for service delivery. The most successful of these programs are those associated with David Olds.[44]

Olds's programs, which focus on families at risk because the mother is young, poor, uneducated, and unmarried, involve nurse visits from the prenatal period until the child turns two. Evaluators have documented many positive effects on both maternal behavior and children's health. As of age two, children in one study site were much less likely than control children to have visited a hospital emergency room for unintentional injuries or ingestion of poisonous substances, although this finding was not replicated at other study sites. As of age fifteen, children of visited mothers were less likely to have been arrested or run away from home, had fewer sexual partners, and smoked and drank less. These children were also less likely to have been involved in verified incidents of child maltreatment. There was little evidence of effects on cognition at four years of age (except among children of initially heavy smokers), though the reduction in delinquent behavior among teens could be expected to improve their school achievement. These studies suggest that locating children at risk and ensuring that they receive necessary services would be a useful complement to other strategies for reducing disparities in child health.

The Special Supplemental Nutrition Program for Women, Infants, and Children

The WIC program probably already plays a large role in remediating health disparities that could lead to gaps in school readiness. It has, for example, been credited with the dramatic decline in the incidence of anemia among young children between 1975 (shortly after it was introduced) and 1985. Several studies indicate that these improvements in nutrition affect children's behavior and ability to learn. Children whose mothers were on WIC during the prenatal period score higher than children not on WIC on the Peabody Picture Vocabulary Test, a good predictor of future scholastic achievement.[45]

In any given month in 1998, 58 percent of all infants were eligible for WIC and roughly 45 percent of all infants received benefits. Among children aged one to four, 57 percent were eligible for WIC and 38 percent of eligible children received benefits. Participation tends to drop off sharply after a child's first birthday, when WIC stops providing valuable infant formula.[46]

The program offers participants coupons that can be used only to purchase specific commodities that meet the nutritional needs of pregnant or nursing women, infants, and children under five. It is a promising vehicle for addressing health disparities in other respects as well. First, WIC agencies have frequent contact with participants, who typically come in at least once quarterly to pick up coupons and get nutritional counseling. Second, the agencies are required to help participants get preventive health care by providing services on-site or through referrals. Third, agencies teach pregnant women that "breast is best," although they may undermine this message by providing free infant formula to women who choose not to breast feed.

Because WIC already serves many children who receive inadequate health care and because it is strongly linked to the provision of health services, it is worth considering whether WIC could do more to reduce health disparities.

Because WIC already serves many children who receive inadequate health care and because it is strongly linked to the provision of health services, it is worth considering whether WIC could do more to reduce health disparities. Further promoting breast feeding would be particularly worthwhile, as would offering screenings and referrals for maternal depression. Keeping children in the program beyond their first year could increase access to health screenings and reduce nutritional problems such as low iron levels.

Discussion and Conclusions

That there are pervasive differences in health between black and white children in the United States is beyond doubt. But do these disparities explain the racial gaps in school readiness? The evidence assembled here suggests that although many specific health conditions impair cognition and behavior in individual children, it is unlikely that any particular condition can explain much of the racial gap. For example, children with ADHD score a third of a standard deviation lower on test scores than children without the disorder. But because ADHD affects relatively few children and because racial differences in its prevalence are small, it explains little of the racial difference in school readiness. This does not mean that ADHD or other health conditions are unimportant. Clearly ADHD often has devastating effects on the 4 percent of boys and 2 percent of girls it affects even if it does not explain much of the racial gap in outcomes.

Moreover, summed over all health conditions, health differentials could well explain a sizeable portion of the racial gap. Three of the conditions evaluated here—ADHD, asthma, and lead poisoning—could explain up to 0.6 of a point in the hypothetical 8 point gap used for illustrative purposes. Not enough evidence is yet available to evaluate how much other common conditions such as injuries, ear infection, and dental caries could contribute. But it would not be far-fetched to suppose that differences in health conditions might together explain one point, or an eighth of the school readiness gap. And maternal health and behaviors may have even

larger effects on racial gaps in school readiness because they affect more children. After all, the majority of children are in excellent health, which means that mean gaps in test scores are driven largely by children who do not have health problems.

Simply summing the various estimates in this paper suggests that as much of a quarter of the readiness gap between blacks and whites might be attributable to health conditions or health behaviors of both mothers and children. Summing yields an upper estimate, because some children may be affected by more than one condition or behavior. But these findings confirm once again that mind and body are intimately connected and that at least some of the persistent gap in school readiness between black and white children may reflect differences in their health.

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