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# The Economic Benefits of Closing Educational Achievement Gaps

Promoting Growth and Strengthening the Nation by Improving the Educational Outcomes of Children of Color

By Robert G. Lynch and Patrick Oakford November 2014

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# Introduction and summary

Our nation is currently experiencing growing levels of income and wealth inequality, which are contributing to longstanding racial and ethnic gaps in education outcomes and other areas. These large gaps, in combination with the significant demographic changes already underway, are threatening the economic future of our country. Thus, closing racial and ethnic gaps is not only key to fulfilling the potential of people of color; it is also crucial to the well-being of our nation. This report quantifies the economic benefits of closing one of the most harmful racial and ethnic gaps: the educational achievement gap that exists between black and Hispanic children and native-born white children.

Gaps in academic achievement are a function of a host of factors, such as income and wealth inequality, access to child care and preschool programs, nutrition, physical and emotional health, environmental factors, community and family structures, differences in the quality of instruction and school, and educational attainment. This suggests there are a wide range of public policies that could help narrow educational achievement gaps; this report demonstrates that there are enormous payoffs to closing the gaps through public policies. It also outlines effective public policy strategies to achieve this goal, though their details are left to future research.

After briefly summarizing the analysis's findings, this report places the educational achievement gaps in context to help explain their significance and the reasons they exist. In particular, the report reviews data on growing inequality, demographic changes, and intensifying global economic competition. This clarifies the need to address educational achievement gaps and helps explain why the benefits of closing gaps are great. The report then describes factors that cause educational achievement gaps and offers public policies that could help close them. The subsequent sections of the report discuss the literature on the importance of academic achievement to economic growth, the methodology used in the analysis, and its detailed findings.

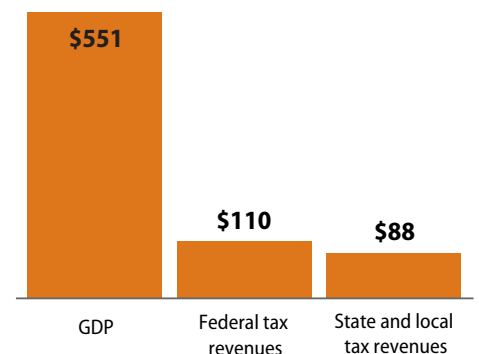
This report illustrates one aspect of the staggering economic cost of the failure to adequately invest in the development of our people: It estimates the increases in U.S. economic growth that would occur if racial and ethnic achievement gaps were closed and the educational playing field were leveled. Specifically, this analysis projects how much greater U.S. gross domestic product, or GDP, would be from 2014 to 2050 if the educational achievements of black and Hispanic children were raised to match those of native-born white children. This study does not examine gaps that exist among other groups—such as Native Americans, Asians, and children of more than one race—because of data limitations and small sample sizes. This does not imply that achievement differentials among other groups do not exist, are not harmful, or do not deserve attention.

If the United States were able to close the educational achievement gaps between native-born white children and black and Hispanic children, the U.S. economy would be 5.8 percent—or nearly \$2.3 trillion—larger in 2050. The cumulative increase in GDP from 2014 to 2050 would amount to \$20.4 trillion, or an average of \$551 billion per year.<sup>1</sup> Thus, even very large public investments that close achievement gaps would pay for themselves in the form of economic growth by 2050.

Closing racial and ethnic achievement gaps—by raising incomes and increasing the size of the economy—would also have significant positive impacts on federal, state, and local tax revenues. From 2014 to 2050, federal revenues would increase by \$4.1 trillion, or an average of \$110 billion per year. State and local government revenues would increase by another \$3.3 trillion, or \$88 billion annually.<sup>2</sup> Therefore, government investments in closing educational achievement gaps that cost less than an average of \$198 billion annually over the next 37 years would pay for themselves even in strictly budgetary terms.<sup>3</sup> To put this figure in perspective, consider that the annual cost to implement the Obama administration’s high-quality, universal pre-K program averages \$7.5 billion per year over the first 10 years.<sup>4</sup>

As explained in the report, these projections understate the impact of closing achievement gaps for at least three reasons. First, they assume that educational achievement improvements are limited to black and Hispanic children; in the real world, policies that increase these children’s educational achievement are likely to improve all children’s achievement. Second, the model does not

**FIGURE 1**  
**Economic and fiscal benefits of closing academic achievement gaps**  
Average annual increase in GDP and tax revenues between 2014 and 2050 in billions of dollars



Source: Author's calculations. See "Methodology."



take into account any of the social benefits—such as better health outcomes—that are likely to occur as a result of educational improvement. Finally, the model does not calculate the potential positive effects on children born to future parents who, because of improved academic achievement, will have higher incomes and thus be able to provide them better educational opportunities. If the model properly accounted for all of these factors, the benefits of improving educational achievement would be substantially larger than those estimated in this study.

The benefits of closing educational achievement gaps amount to much more than just increased GDP and tax revenues. The current generation of children will be better off when they are adults because they will have higher earnings, higher material standards of living, and an enhanced quality of life. Future generations of children will be more likely to grow up in families that can offer them the enriching opportunities of a middle-class lifestyle; they will therefore be less likely to grow up in families struggling in poverty. Present-day adults, whether working or in retirement, will benefit from the fact that higher-earning workers will be better able to financially sustain public retirement benefit programs such as Medicaid, Medicare, and Social Security.

The retirement of the Baby Boomers will put pressure on the federal budget in the coming decades as more retirees draw from these benefit programs. Investing in the nation's educational achievement will provide future budget relief as Americans earn more and, thus, pay more in taxes. For example, closing racial and ethnic educational achievement gaps would lift Social Security tax contributions by \$877 billion by 2050.<sup>5</sup> Similarly, Medicare tax revenues for the Hospital Insurance Fund would increase by \$265 billion from 2014 to 2050, providing a substantial boost to Medicare solvency.<sup>6</sup> In other words, strengthening the educational achievement of our youth will help provide economic security for us, the elderly, and future generations.

These potential economic gains illustrate in stark terms the massive waste of human talent and opportunity that we risk if achievement gaps are not closed. They also suggest the magnitude of the public investments the nation should be willing to make now and in the decades to come to close achievement gaps. Even from a very narrow budgetary perspective, the tax revenue gains this study forecasts suggest that investments to close racial and ethnic achievement gaps could amply pay for themselves in the long run.

Investing in the nation's educational achievement will provide future budget relief.

# The economic imperative to close educational achievement gaps

There are enormous payoffs to investing in the closure of educational achievement gaps. Aside from fulfilling the moral imperative of equal opportunity for all, public policies that narrow racial and ethnic educational achievement gaps will secure the highly skilled workforce the nation will need in the future. It will also retain and expand well-paying jobs and maintain one of the highest standards of living in a rapidly evolving world economy. Achieving these goals is particularly important in light of rising inequality, current demographic changes, and intensifying global economic competition.

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## Rising inequality

U.S. economic inequality has been growing rapidly over the past four decades and is now at its highest levels since the 1920s. Forty years ago, the share of household income accruing to the richest 20 percent of households outstripped the share of income going to the poorest households by 10-to-1. By 2012, that ratio had grown to 17-to-1.<sup>7</sup> Wealth is even more unequally distributed. In 2010, the top 1 percent of households controlled 35 percent of national wealth, and the top 20 percent of households controlled 89 percent of national wealth; the bottom 80 percent of households, meanwhile, held only 11 percent. The ratio of the average wealth of the top 1 percent to the average wealth of the median, or typical, household grew from 125-to-1 in 1962 to 288-to-1 in 2010.<sup>8</sup>

In recent years, rising income and wealth inequality has had the largest negative impact on communities of color, exacerbating longstanding inequities in education, earnings, health, and wealth. Between 2007 and 2010, as white households lost 36 percent of their wealth, black household wealth fell 50 percent, and Hispanic household wealth dropped 86 percent. Thus, by 2010, black household wealth amounted to just 5 percent of that of white households, and Hispanic household wealth was a shocking 1.4 percent of white household wealth, the lowest relative levels in many decades.<sup>9</sup> In 2012, poverty rates among African Americans and

Hispanics outstripped those of non-Hispanic whites by a ratio of nearly 3-to-1.<sup>10</sup> Similarly, the share of people without health insurance in 2012 was nearly two and three times higher for blacks and Hispanics, respectively, than for non-Hispanic whites.<sup>11</sup> Racial and ethnic income gaps have also grown larger: From 1974 to 2012, black and Hispanic median household income both fell relative to the median household income of non-Hispanic whites.<sup>12</sup>

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## Demographic changes

At the same time that the United States is experiencing growing economic inequality and persistent racial and ethnic gaps, it is undergoing two dramatic demographic transitions that are closely interconnected in terms of their national economic impact. Taken together, these transitions—the retirements of Baby Boomers and the increase in the number of the nation’s people of color—heighten the negative economic consequences of race- and ethnicity-based gaps.

Over the next two decades, some 59 million Baby Boomers, the largest generation of Americans to date, will retire and leave the workforce. This will create millions of replacement job openings. On top of the need to replace the Baby Boomers, future economic growth will create jobs for an additional 24 million workers. All told, the U.S. economy will need nearly 83 million new workers by 2030 to fill the jobs created by projected economic growth and to replace the large numbers of Baby Boomers who will be retiring.<sup>13</sup> The loss of so many of these experienced workers means that workforce training and development must be a high priority for a range of public policies, since it will be the skills and abilities of new workers that will largely determine our nation’s future economic prosperity.

A second key demographic transition is that the U.S. population is undergoing a great racial and ethnic shift. Already, more than half of all babies born in the United States are children of color, and within three decades, more than half of the population will be composed of people of color. These children, many of whom will be the children of immigrants, will play a growing and vital role in our future workforce, sustaining our economy for decades to come. As the retirement of the Baby Boomers inevitably continues, the American economy and workforce will increasingly depend on this younger and more diverse generation. More than half of the 83 million additional workers that the U.S. economy will need by 2030 will be people of color, and 80 percent of those workers will be either black or Hispanic.<sup>14</sup>



## Global economic competition and interdependence

As the United States undergoes both of these dramatic demographic shifts and faces rising inequality, it will also have to deal with rapidly intensifying global economic competition and interdependence. International competition and interdependence manifest themselves in many ways, including through trade, climate change, and global resource depletion.

For example, world exports and imports have nearly doubled as a percentage of world production and consumption over the past 30 years. Today, more than 30 percent of everything produced and consumed in the world flows across national borders, up from a little more than 15 percent just 30 years ago.<sup>15</sup> These international trends demand a national focus on productivity enhancement, as global economic competition and interdependence have had—and will likely increasingly have—powerful ramifications on our collective well-being.

How can the United States stem rising inequality, successfully navigate current demographic changes, and ensure its future global economic competitiveness? One obvious strategy is for it to invest more in the development of its economic resources. Its most important resource, of course, is its people—all of its people. Through them, the nation will derive the future workforce to replace the aging Baby Boomers, sustain economic growth, and provide the entrepreneurial expertise needed to undergird continued prosperity. Without a healthy, well-educated, and highly skilled population, the United States will fail to achieve its potential, and its global leadership role may be threatened or diminished.

To succeed in the future global economy, therefore, the United States needs to better harness the talents and productivity of its people and improve the educational outcomes of its students. Given the projected increase in the number of children of color and the challenges they have historically faced, it makes imminent sense to get serious about reducing the educational gaps that hold them back. To formulate public policies to effectively narrow educational achievement gaps, it is helpful to understand factors that contribute to them.

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## Factors that contribute to current education gaps

While educational achievement gaps between white students and students of color have diminished slightly since the 1970s, they have continued to persist on the whole.<sup>16</sup> Researchers have identified a multitude of reasons for the existence of these gaps. The gaps can broadly be explained, however, by the fact that populations of color disproportionately experience the negative impacts of various inequalities that influence educational outcomes.

Perhaps most notably, wealth and income inequality explain a large portion of the racial and ethnic gaps in children's educational outcomes. Test-score differences between children from wealthy and poor families are much larger today than they were 30 years ago, even larger than test-score differences by race and ethnicity.<sup>17</sup> Thus, black and Hispanic children, on average, have lower test scores than native-born white children in large part because they are more likely to be raised in poor, low-income families than are native-born white children.

What are some of the factors that explain why children from wealthy families do better on achievement tests than do children from moderate- or low-income families? Sociologist Meredith Phillips finds that by age 6, wealthier children have spent 1,300 more hours than poor children participating in a broad array of enrichment activities, such as music lessons, travel, and summer camp.<sup>18</sup> These activities facilitate educational achievement later in life. Greg J. Duncan, George Farkas, and Katherine Magnuson demonstrate that children from poor families are two to four times more likely than children from wealthy families to have classmates with low skills and behavioral problems,<sup>19</sup> attributes that have negative effects on child learning. Anne Fernald, Virginia A. Marchman, and Adriana Weisleder found significant differences in the vocabulary and language processing of 18-month-old infants from low- and high-income families.<sup>20</sup> They found that by age 2, children from low socioeconomic backgrounds were already six months behind children from high socioeconomic backgrounds in skills critical to language development and subsequent learning.<sup>21</sup> Betty Hart and Todd Risley have estimated that by age 3, children from low-income families have heard 30 million fewer words than have children from upper-income families.<sup>22</sup> As a result of such disparities, Sean F. Reardon finds that the gap between rich and poor children's math and reading achievement scores is now much larger than it was 50 years ago.<sup>23</sup>

But income inequality is not the only source of academic achievement gaps. Researchers Petra Todd and Kenneth Woplin have found that conditions at a student's home—such as access to books, newspapers, or extracurricular activities—have a significant impact on test scores. Specifically, the authors found that when conditions at a student's home are taken into account, the test-score gap decreases by 10 percent to 20 percent.<sup>24</sup> Similarly, researchers David Card and Jesse Rothstein have found that neighborhoods with higher levels of segregation experience greater gaps in white-black SAT scores. The authors conclude that the differences in the white-black test gap in unsegregated neighborhoods are more than 20 percent smaller than those in highly segregated neighborhoods.<sup>25</sup>

Inequalities in income and other factors are often closely intertwined. For example, evidence from neuroscience and developmental psychology suggests that early childhood is an especially sensitive period for a child's brain development.<sup>26</sup> During this time, brain circuitry develops that underpins children's abilities for cognition, attention, and stress management. Research has established that children's experiences with their primary caregivers strongly influence the course of that brain development, with stressed, emotionally unavailable, and non-stimulating caregivers undermining it.<sup>27</sup> Moreover, economic disadvantage in early childhood has strong associations with parents' psychological distress and the emotional support and cognitive stimulation they provide their young children.<sup>28</sup> The stress of low-income parents is, unfortunately, positively associated with the stress of living in relatively poor, high-crime neighborhoods.<sup>29</sup> Thus, income gaps contribute to gaps in effective parenting and to parents' psychological health, which lead to gaps in young children's social, psychological, and emotional development, as well as to gaps in their later-life educational outcomes.

Similarly, school and housing segregation by race and ethnicity are related to income inequality and weaken the academic achievement of black and Hispanic children. A large body of research shows that children from low-income families who attend relatively racially and economically segregated schools have lower academic achievement than do similar poor children who attend more integrated schools. Poor, segregated neighborhoods and schools have less access to key resources crucial to children's success, such as low crime rates, experienced and effective teachers, adequate schools, and parks and other green spaces.<sup>30</sup> African American and Hispanic children who attend schools in low-income neighborhoods are also less likely to be exposed to rigorous curricula. For example, they are less likely to take algebra and calculus.<sup>31</sup>

In addition to being more likely to be born into low-income families that reside in high-poverty neighborhoods and to attend high-poverty schools with less experienced and effective teachers, children of color also suffer various forms of racial and ethnic discrimination. In schools and in the justice system, for example, children of color often receive harsher penalties for the same rule violations than do white children.<sup>32</sup> Children of color are also less likely to be tested, diagnosed, and treated for illnesses and learning disabilities that influence school performance.<sup>33</sup>

In short, many of the causes of educational achievement gaps have already been identified. Achievement gaps could at least be partially addressed by closing racial and ethnic gaps that exist in a variety of contexts. This could be done by decreasing income equality, reducing racial and ethnic segregation and other forms of discrimination, equalizing home environments, reducing the impact of criminality on society, improving the quality of schools in low-income neighborhoods, and lessening parents' psychological distress.

Indeed, the factors identified above that contribute to educational achievement gaps vary from location to location. Not surprisingly, therefore, racial and ethnic educational achievement gaps already vary considerably by state and are reversed for some groups across states. For example, while the average black-white gap on the 2013 National Assessment of Educational Progress, or NAEP, achievement test in eighth-grade mathematics was 30.46 points, black children in Massachusetts outscored their white counterparts in West Virginia by 2.16 points.<sup>34</sup> Similarly, although the average Hispanic-white gap on the 2013 NAEP achievement test in eighth-grade mathematics is 22.17 points, Hispanic children in New Jersey, Montana, and Texas outperformed their white counterparts in Oklahoma, Alabama, and West Virginia.<sup>35</sup> Thus, these racial and ethnic achievement gaps are not simply a function of race or ethnicity but, instead, are largely a function of a multitude of inequalities, including economic disparities.

# Public policies to reduce educational achievement gaps

As discussed above, there are a wide variety of public policies that could help narrow educational achievement gaps. Many researchers have focused on improving schools through education reform. Specific recommendations from this research that have been correlated with improved educational outcomes include expanding learning time and improving teacher quality.<sup>36</sup> But there are also many other effective approaches. For example, a large and growing body of research has demonstrated the academic, social, and economic benefits of high-quality early childhood interventions. Child and maternal health, conditions in the home and in the broader community, and the schooling environment are particularly important for young children's education and development. Targeted health, academic, social, and emotional interventions during the early childhood years can have profound influences on brain development, language skills, and learning. They also affect social relations and economic outcomes such as employment and earnings. Below, three broad policy areas are discussed that could help reduce achievement gaps: early childhood care and education, criminal justice reform, and parental and workplace supports. This is far from an exhaustive list, but it nonetheless illustrates that closing achievement gaps requires policies beyond those that simply promote education reform.

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## Early childhood care and education

One of the most effective ways to reduce education gaps is to provide access to high-quality, early child care and pre-K programs. Researchers have found that investing in early childhood care, education, and health is one of the best ways to improve children's well-being, increase the educational achievement and productivity of both children and adults, and reduce social problems such as crime. Research has also determined that the academic skills children acquire by age 5, when they typically enter kindergarten, are strongly correlated with their subsequent achievement in school and success in the labor market.<sup>37</sup> In a thorough review of the literature, economists Douglas Almond of Columbia University and Janet



Currie of Princeton University found that child and family characteristics at the start of formal schooling explain labor-market outcomes as much as educational attainment does.<sup>38</sup> In other words, the first five years of a child's life are as important to success in the workplace as all subsequent years of formal education. Thus, a comprehensive and integrated set of early childhood support systems that encourage nurturing and stimulating early care could help close achievement gaps.

Assessments of high-quality early education programs have established that participating children are more successful in kindergarten through grade 12 and in life after school than are children not enrolled in such programs.<sup>39</sup> In particular, children who participate in high-quality early education programs tend to score higher on math and reading achievement tests; have greater language abilities; require less remedial, or special, education; and are less likely to repeat a grade. They have lower dropout rates, higher levels of schooling attainment, and graduate from high school and attend college at higher rates. Because high-quality programs offer behavioral and health screenings—including vision, dental, and hearing screenings—children who attend them experience significantly less child abuse and neglect, have better health outcomes, and are less likely to be teenage parents; all of these factors also significantly improve children's educational outcomes.<sup>40</sup> Both as juveniles and as adults, children who attend early education programs are less likely to engage in criminal activity. And once they enter the labor force, their employment rates and incomes are higher, as are the taxes they pay. While all children may benefit from high-quality pre-K programs, public provision of such programs would disproportionately benefit children of color. These children are currently less likely to attend any early child care or education programs, and the programs in which they do enroll tend to be of low quality.<sup>41</sup>

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## Criminal justice reform

Policies that reform the juvenile and criminal justice system may also help close achievement gaps. Children of color are more likely to experience violence and have interactions with the juvenile and criminal justice systems; such interactions can damage future well-being.<sup>42</sup> For example, black children are 4.5 times more likely and Hispanic children are 2.5 times more likely than white children to be apprehended for the same crime.<sup>43</sup> These children are also more likely to have an incarcerated parent, a circumstance associated with a variety of poor educational and economic outcomes.<sup>44</sup> Thus, policies that help address violence, reduce racial and ethnic bias in the justice system, eliminate unnecessary contact between

youth and the juvenile justice system, support incarcerated parents, and guarantee quality educational and training opportunities for incarcerated youth can help reduce educational achievement gaps.

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## Parental supports, good jobs, and workplace flexibility

Specific policies to support parents and caregivers may also be effective at reducing educational achievement gaps. For example, the health of pregnant mothers and the practice of breastfeeding affect the emotional and physical health of infants and their ability to learn.<sup>45</sup> Thus, comprehensive prenatal and postnatal care for pregnant mothers and their infants lead to healthier babies and children who are better equipped to learn.<sup>46</sup>

Research also shows that the amount of time parents spend with their children can influence academic achievement, enhance emotional well-being, reduce teen pregnancy, and lower high school dropout rates.<sup>47</sup> Therefore, family medical leave policies and paid sick days that allow workers to care for a newborn, adopted, or ill child; paid vacation time; and flexible work schedules that enable parents and children to spend more time together could help reduce achievement gaps.

Likewise, studies find that the health and stress levels of parents and caregivers—especially those of pregnant mothers—affect children’s development, ability to learn, and educational attainment.<sup>48</sup> Stress during the early childhood years, such as that brought on by parental unemployment or demanding jobs, can diminish children’s subsequent academic and labor-market accomplishments.<sup>49</sup> Expanding health care coverage for physical and emotional health, particularly for low- and moderate-income families, could help reduce achievement gaps. The Affordable Care Act provides this type of coverage, and the expansion of Medicaid at the state level would especially benefit some of the most stressed out parents and caregivers.

Likewise, public policies that promote higher wages, higher employment, and higher family incomes may reduce educational achievement gaps. There is a growing body of evidence that shows that increases in family income improve the educational outcomes of children and can narrow achievement gaps. Several studies have found that increases in family income due to public policies—such as expansions of the Earned Income Tax Credit or other welfare programs—significantly improve test scores.<sup>50</sup> Importantly, families use their higher incomes to improve their children’s learning environment through higher-quality child care and increased participation

in early education programs.<sup>51</sup> Thus, a higher minimum wage, anti-wage-theft policies, an expanded Earned Income Tax Credit, and macroeconomic policies that support higher employment and higher wages are examples of policies that could reduce educational achievement gaps.

These are a few examples of the types of policies that could help reduce racial and ethnic gaps by improving educational achievement. There are costs associated with implementing these policies, but this report shows that they would likely be more than offset by the economic benefits—including the tax benefits—of improving educational achievement. As discussed next, educational achievement is a key component of human capital, which is in turn a prime determinant of economic growth, wealth, and well-being.

# The role of human capital in educational achievement and economic growth

Understanding the basis and sources of economic growth and the factors that bring about national affluence has been at the center of economic study for centuries. Indeed, understanding the meaning and causes of prosperity is at the heart of Adam Smith's seminal 1776 work, appropriately titled, *An Inquiry into the Nature and Causes of the Wealth of Nations*. Over the decades and across the globe, theoretical and empirical investigations into the causes of long-run growth have produced a large and growing body of economic research that has found human capital to play a pivotal role in economic growth and the material well-being of people and nations.<sup>52</sup>

Human capital refers to people's knowledge, skills, health, and habits. Higher levels of human capital are associated with greater earnings and productivity. Thus, expenditures on education, training, and health care are considered investments in human capital, as they enhance humans' earnings and productive capacity.

The largest economic effects of these investments are those associated with education. Many studies have shown that educational attainment—the number of school years completed—correlates closely with both individual earnings and economic growth.<sup>53</sup>

In general, more education is associated with higher individual earnings. In particular, studies within and across many countries have found that an additional year of schooling translates into a roughly 10 percent increase in annual individual earnings.<sup>54</sup> Aside from this individual benefit, there is further evidence that additional years of schooling provide social benefits in the forms of improved health, higher levels of civic participation, lower crime rates, and—most importantly for this analysis—greater economic growth, which is discussed below.<sup>55</sup>

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## Increased educational attainment improves economic growth

The theoretical basis for the relationship between additional schooling and economic growth is straightforward. To the extent that educational attainment increases human capital, it also enhances the productivity of a nation's workforce, increases the rate of technological innovation, and facilitates the diffusion and adoption of new production techniques, all of which help boost economic growth.<sup>56</sup>

The empirical research supports these theoretical conclusions. Hundreds of studies have found statistically significant and positive associations between years of schooling and the economic growth of national economies. Each additional year of schooling is associated with greater long-run economic growth rates. However, the magnitude of the impact that additional years of schooling have on economic growth varies considerably from study to study.<sup>57</sup>

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## Educational attainment versus educational achievement as measures of human capital

A drawback of studies and models that use years of schooling as proxies for human capital is that they implicitly assume that one year of schooling in every school in every country provides the same increase in human capital as one year of schooling in any other school in any other country. Moreover, such models assume that schools are the main or only source of the education and skills that lead to the expansion of human capital. They do not take into account the facts that school quality varies within and across countries and that nonschool factors—such as health, environment, access to opportunities, and community structure—have important effects on skills and, thus, human capital development.

Instead of using school attainment as a proxy for human capital, a number of researchers have proposed using measures of cognitive skills as a more appropriate proxy. In theory, cognitive skills should more accurately reflect the learning and abilities of workers because cognitive skills should depend not only on the time people spend in schools and the quality of those schools but also the education people acquire outside of formal schooling. Hence, cognitive skills used as a proxy for human capital in regression models should provide more accurate estimates of the effects of human capital on economic growth. Indeed, a body of research developed over the past two decades suggests that cognitive skills are a better measure of human capital than years of schooling.<sup>58</sup>



Generally, this research proposes using scores on international Programme for International Student Assessment, or PISA, math and science tests as indicators of cognitive achievement and, thus, as proxies for human capital. It then investigates the relationship between cognitive skills and economic growth. When cognitive skills are included in regression models, the association between years of schooling and economic growth drops to nearly zero—and becomes statistically insignificant—while the association between cognitive skills and economic growth is highly significant, both in a statistical and economic sense. In other words, what matters for economic growth is not how much time children spend in school but rather the knowledge, skills, and work habits they acquire both in and out of school. As Eric A. Hanushek and Ludger Woessman note, the strong, positive effect of cognitive skills on economic growth “dwarfs the association between quantity of education and growth.”<sup>59</sup>

What matters is the knowledge, skills, and work habits acquired in and out of school.

These recent findings may be confusing to some who think of eliminating racial and ethnic education gaps in the more traditional sense—as an exercise in giving nonwhite children the same educational attainment as white children. Equalizing educational attainment has often been defined as ensuring that black and Hispanic children have as many years of schooling as white children or that they graduate from high school or complete college at the same rates. However, the newer research suggests that what is important is academic achievement, which is related to educational attainment but also to a host of other factors, including income and wealth inequality, access to day care and preschool programs, the number of books in the home, nutrition, health, neighborhood safety, exposure to lead paint and other environmental factors, and the emotional and psychological stress of parents and children. This implies there is a wide range of policies that could be effective in closing educational achievement gaps, such as the numerous policies described in the previous section of this report.

Below, the report demonstrates the enormous payoffs to closing the cognitive skills gap through public policies. The methodology employed to calculate these benefits is discussed in the next section, and the subsequent section highlights detailed findings on the GDP and tax consequences of closing racial and ethnic educational achievement gaps.

# Methodology

We use the results of the literature on the effects of cognitive skills on economic growth to estimate the increase in the U.S. GDP that would result from closing the educational achievement gap between black and Hispanic students and native-born white students. We use GDP because it is the broadest and most widely accepted measure of an economy's size.

As noted above, a growing body of research uses cognitive skills, as reflected in international test scores, as a measure of human capital. We base our analysis on the findings of this research, which suggests that human capital accounts for a significant portion of the economic growth of economically advanced nations. In particular, we use the results of the regression analyses conducted by Eric A. Hanushek and Ludger Woessmann that found statistically significant and strong effects of cognitive skills—as measured by the internationally administered PISA test scores—on the economic growth of 24 nations in the Organisation for Economic Co-operation and Development, or OECD, from 1960 to 2000.<sup>60</sup> Specifically, Hanushek and Woessmann found that “an increase of one standard deviation in education achievement (i.e., 100 test-score points on the PISA scale) yields an average annual growth rate over 40 years that is 1.86 percentage points higher.”<sup>61</sup>

We perform a simulation using the regression estimate in their research to project the economic impact of closing the educational achievement gap between black and Hispanic students and native-born white students. Our projection model closely follows the model developed by Hanushek and Woessmann in 2010, though we make several adjustments to account for factors specific to this study, such as the significant racial and ethnic demographic changes that the United States will experience in the coming decades.

We use the United States' 2012 PISA test scores in math and science in our analysis.<sup>62</sup> We assume that the estimated impact of the PISA test scores on growth is causal, meaning any policy that increases the test scores of black and Hispanic students will result in faster economic growth.

Native-born white students scored an average of 506 on the math test and 528 on the science test, while black students scored an average of 421 and 439, respectively. Hispanic students had mean scores of 455 and 462. We raised the achievement test scores of black and Hispanic students to match those of native-born white students and recalculated what the average PISA math and science test scores for the nation as a whole would be if the achievement gaps were closed. We determined that if the achievement gaps were closed, the average test score for the nation would rise by 24 points in math and 28 points in science. The 24-point improvement in math and the 28-point improvement in science represent an increase of 0.28 standard deviations on the combined average score.

Our simulation calculates the annual per-capita GDP growth-rate increase as the educational improvements are phased in fully. To capture the demographic trend that black and Hispanic children will make up a progressively larger portion of the U.S. population, we gradually increase the share of black and Hispanic children over the years of the simulation based on the population projections of the U.S. Census Bureau. As the share of black and Hispanic children in the U.S. population rises, closing achievement gaps will have a relatively larger effect on average national test scores and, thus, a larger positive impact on the economy.

Our purpose is to illustrate the effects of improvements in academic achievement so that we can better understand their economic consequences. Thus, we do not specify the causes of the educational improvement. We note in general, however, that—as discussed earlier in this report—improvements in cognitive skills are not necessarily a function solely of educational reforms but potentially of a variety of policies. For example, enhancements in educational achievement could result from the adoption of high-quality, universal pre-K, child health and nutrition policies, better prenatal and postnatal care, criminal justice reforms that help lessen the detrimental effects of incarceration on the children of prisoners, or combinations of these and many other policies.

Whatever the source of the improvement in cognitive skills, we assume that all of the achievement gains are not immediate but that they are instead phased in linearly over a 20-year period. Thus, the cognitive skills improvements are assumed to be very small after one year, but they grow steadily year after year so that after 20 years, the black and Hispanic achievement gaps relative to native-born whites are completely closed.

Similarly, we assume that the economic impacts of enhanced cognitive skills are not felt until students with better skills enter the labor force. As these new, higher-skilled workers replace older, retiring workers, the average skill of the workforce progressively improves, productivity increases, and economic growth accelerates.

We assume that the average laborer works for 40 years. This means that it will take 60 years to feel the full economic effects of policies to improve cognitive skills—20 years to close the achievement gaps and 40 years until the full workforce reaches the higher skill level.

Our simulation indicates the average annual increase in economic growth that results from the gradual closing of the educational achievement gap and the upgrade in the skill level of the workforce. We then multiply the annual estimated growth increase by Congressional Budget Office, or CBO, projections of U.S. GDP to derive the annual increases in GDP over the next 80 years that result from closing achievement gaps.

To estimate the tax revenue impacts of GDP increases that are induced by closing education achievement gaps, we reviewed the post-1980 historical record on federal, state and local, Social Security, and Medicare revenues as a percentage of GDP. Except for during the recession-affected year of 2009, federal, state, and local revenues have varied between 30 percent and 36 percent of GDP since 1980. Federal revenues usually varied between 15 percent and 20 percent of GDP, while state and local revenues typically varied between 13 percent and 18 percent.<sup>63</sup>

Informed by this review and assuming that additional income would be taxed at marginal rates higher than average tax rates, we assumed that federal, state, and local revenues derived from future increases in GDP would sum to the high end of the historical range, or 36 percent of GDP. In particular, we assumed that additional federal revenues would equal 20 percent of future increases in annual GDP and that additional state and local revenues would amount to 16 percent of the increase in annual future GDP. We further assumed that additional Social Security taxes and Medicare revenues—among the most significant subcomponents of these federal and state and local revenues—would equal 4.3 percent and 1.3 percent, respectively, of annual increases in GDP, which is consistent with their current levels. We applied these rates to the calculated increases in GDP to determine increases in revenues.

To compare the worth of these future increases in GDP and tax revenues to the current value of GDP and revenues, we followed the common practice of discounting the future increases in GDP to recognize that each dollar of GDP acquired in the future is less valuable than each dollar of GDP secured today. In general, a dollar earned sometime in the future is less valuable than a dollar earned today because of the interest-earning capacity of money. For example, if the current interest rate is 3 percent, then 97 cents earned today and put aside in an interest-bearing account would be worth approximately \$1 a year from now. This is equivalent to saying that a dollar earned a year from now would be worth only 97 cents today. The discounted future value, known as the present value, allows us to state the value of future benefits in present dollars so that they can be more easily compared to current values. Thus, we calculated the present value of these future GDP tax revenue increases by assuming a standard 3 percent discount rate. All calculations were in real—inflation-adjusted—numbers, with 2014 as the base year.



# Findings

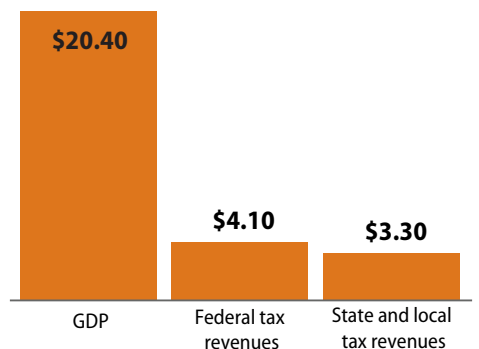
We found that closing achievement gaps would boost GDP by 5.8 percent, or \$2.3 trillion in 2050. In present value terms, this implies \$765 billion in greater GDP, or more than \$1,900 for every man, woman, and child in the United States—\$7,600 for every family of four.<sup>64</sup> If blacks and Hispanics fully captured the increase in GDP that derived from improvements in their human capital, then the per-capita GDP of blacks and Hispanic would rise by nearly \$4,700, or \$18,800 for a family of four.<sup>65</sup> These increases would dramatically raise their standards of living and sharply lower income inequality. The cumulative increase in GDP over the 37-year period from 2014 to 2050 would amount to \$20.4 trillion, or \$551 billion annually.<sup>66</sup> Thus, reforms that close achievement gaps and cost less than \$20.4 trillion over 37 years—or \$551 billion annually—would more than pay for themselves in terms of economic growth. These sums indicate that there is enormous leeway for public investment in reforms that would pass a stringent cost-benefit analysis.<sup>67</sup>

Increases in GDP lead to increases in taxes. Thus, closing racial and ethnic achievement gaps would also have significant positive implications for federal, state, and local tax revenues. Between 2014 and 2050, federal revenues would increase by \$4.1 trillion, or \$110 billion on average per year. Over the same time period, state and local government revenues would increase by another \$3.3 trillion, or \$88 billion annually. Thus, government investments to close educational achievement gaps that cost less than an average of \$198 billion annually over the next 37 years would pay for themselves even in strictly budgetary terms.<sup>68</sup>

As noted earlier, the retirement of the Baby Boomer generation will put pressure on the federal budget in coming decades as more retirees draw from benefit programs; investing in educational achievement will provide future budget relief, as workers will earn more and subsequently pay more in taxes. For example, closing racial and ethnic educational achievement gaps would lift Social Security tax contributions by \$877 billion over the 37-year

**FIGURE 2**  
**Economic and fiscal benefits of closing academic achievement gaps**

Cummulative increase in GDP and tax revenues by 2050 in trillions of dollars



Source: Author's calculations. See "Methodology."

period between 2014 and 2050.<sup>69</sup> Similarly, Medicare tax revenues for the Hospital Insurance Fund would increase by \$265 billion, providing a substantial boost to the solvency of Medicare.<sup>70</sup> These Medicare revenues would cover about 6 percent of the projected shortfall in the Hospital Insurance Fund in 2050 and a growing share of the projected shortfall in subsequent years.<sup>71</sup>

Our projections understate the impact of closing achievement gaps for at least three reasons. First, we understate the impact of any reform on economic growth by making the implicit assumption that educational achievement improvements are limited to black and Hispanic children. In the real world, of course, policies that increase the educational achievement of black and Hispanic children are likely to improve the test scores of all children. Our projections probably underestimate the economic impact of closing achievement gaps by ignoring this fact.

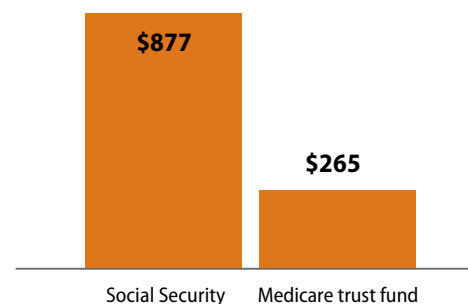
Second, our projections do not take into account any of the social benefits, aside from economic growth, that are likely to occur as a result of the improvement in the cognitive skills of our people. Just like the research findings on the benefits of additional schooling, it is probable that higher levels of cognitive achievement are likely to produce many social benefits, including improved quality of life, improved health, higher levels of civic participation, and lower crime rates.

Finally, our model does not calculate the potentially positive effects for children born to parents of the future who, because their cognitive skills are improved, will have higher incomes and be able to provide better educational opportunities to their children. Hence, the children of future parents may be able to earn more and lead better lives. If these generational effects were properly accounted for, the benefits of improving educational achievement may be substantially larger than those we have estimated in this study.

Critics may argue that closing educational achievement gaps and fully phasing in the economic benefits of improved educational outcomes could take less, or more, years than this simulation proposes. We agree. In general, the longer it takes to close achievement gaps and fully phase in the benefits of a better-educated population, the greater the cost in terms of the loss of potential economic benefits. The point of this study was to estimate the benefits of one specific scenario and to illustrate that, whether it takes more or fewer years, the costs of failing to close educational achievements gaps are enormous, and they will grow with time.

**FIGURE 3**  
**Impact of closing achievement gaps on Social Security and Medicare**

Cumulative increase in tax contributions to Social Security and Medicare between 2014 and 2050 in billions of dollars



Source: Author's calculations. See "Methodology."

# Conclusion

The benefits of closing achievement gaps by improving the educational outcomes of children amount to much more than just increased GDP and tax revenues. Investing in our children to improve cognitive skills has positive implications for both current and future generations of children, as well as adults. The current generation of children will benefit from higher earnings, higher material standards of living, and an enhanced quality of life. Future generations will benefit because they will be more likely to grow up in families that can offer them the enriching opportunities of a middle-class lifestyle, and they will be less likely to grow up in families living in poverty. And adults—both those now working and in retirement—will eventually benefit from the fact that higher-earning workers will be better able to financially sustain our public retirement benefit programs such as Medicaid, Medicare, and Social Security. In other words, strengthening the educational achievement of our youth will help provide lasting economic security for us, the elderly, and future generations.

Completely closing educational achievement gaps will not happen instantly, but we can begin to narrow them immediately. We already know many of the reasons these gaps exist and policies that can help close them. Thus, we can begin to experience some of the enormous economic gains described in this report as policies are implemented that successfully narrow achievement gaps. The key is to invest, and continuously reinvest, in the health, education, skills, and social well-being of our most valuable resource—our people. Such investments will simultaneously reduce economic disparities, strengthen ladders of opportunity, and generate the resources we need for future investments, creating a virtuous cycle of prosperity. Investments made today in the cognitive skills of our people will help create pathways for continuous growth and enhance future wealth and well-being.

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## Acknowledgements

The authors would like to thank John Schmitt, Angela Kelley, Vanessa Cardenas, Marshall Fitz, Philip E. Wolgin, Farah Ahmad, and CAP's Education and Economics teams for their helpful comments and suggestions.

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## Endnotes

- 1 These figures are expressed in real 2014 dollars. The economic effects of closing achievement gaps build upon themselves so that over time the growth consequences are increasingly magnified. For example, by 2094, the last year of our analysis, we project that the U.S. economy would be one-third—or \$33.8 trillion—larger than it would otherwise be and the cumulative increase in GDP over the 80-year period from 2014 to 2094 would amount to \$617.8 trillion.
- 2 These figures are expressed in real 2014 dollars.
- 3 To facilitate comparison to today's values and to get a rough idea of the size of the public investments that we should be willing to make today if such investments were able to close achievement gaps, we calculated the present value of the projected growth in GDP and tax revenues. In present-value terms, the increase in GDP in 2050 would be the equivalent of an additional \$765 billion today and the cumulative increase in GDP over the 37-year period from 2014 to 2050 would amount to \$8.4 trillion. Thus, public investments that closed achievement gaps and cost less than \$228 billion annually and \$8.4 trillion cumulatively over the next 37 years would repay themselves in the form of economic growth by 2050. Similarly, the present value of the increase in tax revenues in 2050 would be \$275 billion and the present value of the cumulative increase in tax revenues over the next 37 years from 2014 to 2050 would sum to \$3 trillion or \$82 billion on average per year. Thus, public investments that closed achievement gaps and cost less than \$3 trillion, or an average of \$82 billion annually in present value over the next 37 years, would more than pay for themselves in budgetary terms.
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- 61 For the sake of precision, the point estimate is 1.864 in Table 2, Column 2 in Hanushek and Woessmann, "How Much Do Educational Outcomes Matter in OECD Countries?," p. 55.
- 62 PISA test scores are available at National Center for Education Statistics, "Program for International Student Assessment (PISA)," available at <http://nces.ed.gov/surveys/pisa/> (last accessed August 2014).
- 63 Data on federal receipts are from Office of Management and Budget, *Opportunity for All: The President's Fiscal Year 2015 Budget* (The White House, 2014), Historical Tables, available at <http://www.whitehouse.gov/omb/budget/Historicals>; data on state and local receipts are from Bureau of the Census, "State and Local Government Finances," available at <https://www.census.gov/govs/local/> (last accessed August 2014).

- 64 Based on Bureau of the Census, *2012 National Population Projections* (U.S. Department of Commerce, 2013), available at <http://www.census.gov/population/projections/data/national/2012.html>. It is projected that the United States will have 400 million inhabitants in 2050.
- 65 *Ibid.*, which projects that the United States will have 164 million black and Hispanic inhabitants in 2050.
- 66 In present-value terms, the cumulative increase in GDP over the next 37 years would sum to \$8.4 trillion, or \$228 billion on average per year. Thus, public investments that close achievement gaps and cost less than \$8.4 trillion, or an average of \$228 billion annually in present value over the next 37 years, would more than pay for themselves.
- 67 In 2094, the closing of achievement gaps would increase GDP by a third or \$33.8 trillion. In present-value terms, this implies \$3.2 trillion in greater GDP in 2094. The cumulative increase in GDP over the 80-year period from 2014 to 2094 would amount to a stunning \$618 trillion undiscounted and \$95 trillion in present value. Reforms that closed achievement gaps and had a present-value cost over 80 years of less than \$95 trillion, would more than pay for themselves. Again, these sums indicate that there is enormous leeway for public investment in reforms that would pass stringent cost-benefit analysis.
- 68 In present-value terms, the increase in tax revenues in 2050 would be \$275 billion, and the present value of the cumulative increase in tax revenues over the next 37 years would sum to \$3 trillion, or \$82 billion on average per year. Thus, public investments that close achievement gaps and cost less than \$3 trillion, or an average of \$82 billion annually in present value over the next 37 years, would more than pay for themselves in budgetary terms.
- 69 In the long run, the solvency of Social Security would improve by less than the increase in tax revenues because Social Security benefits increase with contributions. However, these increased contributions would ease the financial stress of the system because they take place precisely during the time period when the Social Security system is most financially stressed, due to the retirement of the Baby Boomers, and long before corresponding benefits would have to be paid out.
- 70 Medicare benefits do not increase with Medicare tax contributions; therefore the full amount of these revenues can be expected to provide budgetary relief.
- 71 For example, additional Medicare tax revenues from closing educational achievement gaps would cover approximately 21 percent of the projected deficit in the Hospital Insurance Fund over the next 75 years, ending in 2089. Authors' calculations using data from the Board of Trustees of the Federal Hospital Insurance and Federal Supplementary Insurance Trust Funds, "2013 Annual Report of the Boards of Trustees of the Federal Hospital Insurance and Federal Supplementary Insurance Trust Funds" (2013), available at <http://downloads.cms.gov/files/TR2013.pdf>.

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