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A Cost-Effectiveness Analysis of Opportunity-Expanding Interventions for Economic Mobility Across the Life Cycle

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ABSTRACT

Unequal access to educational, economic, and developmental opportunities may contribute to differences in educational attainment, persistence, and long-term economic mobility. This paper examines which opportunity-expanding investments generate the greatest improvements in these outcomes relative to their costs. To answer this question, the paper synthesizes and compares findings from research in economics, education, and public policy across several types of interventions, including information and administrative assistance, behavioral interventions, mentoring and coaching, apprenticeships, and investments in early childhood education, schools, neighborhoods, and skill development. The evidence suggests that cost-effectiveness depends largely on the specific barrier limiting an individual's access to opportunity. Low-cost information, behavioral, and administrative interventions can generate substantial returns when information or application barriers are the primary constraint, while more intensive investments can produce larger long-term improvements when individuals lack access to high-quality educational or developmental opportunities. These findings suggest that policymakers should match interventions to the barriers they address rather than rely on a single approach. However, comparisons across interventions are difficult because studies differ in their research designs, outcomes measured, time horizons, and available cost estimates. Overall, the evidence supports targeted opportunity-expanding investments as a strategy for improving economic mobility while maximizing the impact of public resources.

INTRODUCTION

Many people with similar levels of talent often achieve very different economic outcomes, and one possible explanation for these differences is unequal access to opportunity. For example, Bailey and Dynarski (2011) find that college completion rates were approximately 9% among children from the lowest-income quartile and 54% among those from the highest-income quartile, a 45-percentage-point gap. The "lottery of birth" can have a significant effect on a person's long-term outcomes. Inequality in access to educational, economic, and developmental opportunities can contribute to differences in educational attainment, motivation, persistence, and eventual economic mobility.

A notable example of the opportunity gap is found among the neighborhoods in which children grow up. Children with similar backgrounds can have very different access to high-quality schools, resources, and economic opportunities depending on where they live. Research in papers such as Chetty, Hendren, and Katz (2016) and Chetty and Hendren (2018) provides evidence that neighborhood conditions can causally affect children's long-term economic mobility.

This paper defines opportunity as having access to educational, economic, and developmental opportunities that can improve an individual's future outcomes. Having greater opportunity can influence motivation, persistence, educational investment, and even long-term success. Opportunity-expanding investments are policies or interventions that increase people's access to these opportunities by reducing barriers such as financial constraints, limited information, or differences in available resources. Motivation refers to an individual's willingness to pursue their goals, while persistence refers to continued effort despite setbacks. Long-term economic mobility refers to improvements in educational attainment, employment, income, and other measures of long-term socioeconomic success.

Every year, governments put billions of dollars toward programs meant to give people more access to opportunities. For example, the U.S. Department of Education's fiscal year 2026 budget request included $66.7 billion in discretionary funding for education programs and activities (U.S. Department of Education 2025). However, not all of these investments lead to the same results or provide the same return. That leads to the question: Which investments that expand access to opportunity generate the greatest increases in motivation, persistence, and long-term economic mobility per dollar spent?

This paper synthesizes evidence from economics, education, and public policy to compare the effectiveness and cost-effectiveness of these interventions. Existing research on the topic often evaluates one intervention rather than comparing multiple interventions to find which will actually bring the greatest return. Also, present research evaluates an intervention over one stage of life rather than what will bring the best outcome for the following stages.

The evidence throughout this paper highlights that opportunity-expanding investments are most cost-effective when they target the specific barrier preventing individuals from accessing or benefiting from an opportunity. For example, Hoxby and Turner (2013) show that relatively low-cost information and application assistance can substantially increase college application and enrollment among high-achieving, low-income students by addressing informational barriers. Similarly, Bettinger et al. (2012) find that providing assistance with the college financial aid process can increase college attendance by reducing administrative barriers. However, when individuals lack access to high-quality opportunities themselves, more intensive investments may be necessary. Heckman et al. (2010) demonstrate that early childhood education can produce substantial long-term economic benefits, while Chetty et al. (2016) provide evidence that access to higher-quality neighborhoods can improve children's long-term economic outcomes. Together, such results suggest that policymakers should not rely on a

single type of intervention. Instead, investments should be matched to the specific barriers limiting access to opportunity while also considering the size, cost, and timing of their long-term benefits.

BACKGROUND

Educational outcomes differ substantially by socioeconomic status. Students from higher-income families are far more likely to complete college than those from lower-income families. Bailey and Dynarski (2011) find that the bottom quartile of income college completion rate is only 9%, which differs from the 54% completion rate for the top quartile of income families. A 45 percentage point gap indicates that socioeconomic background is associated with unequal educational outcomes. The following disparities can start before students even reach college, since differences in academic preparation and skills can affect their later educational outcomes (Bailey and Dynarski 2011).

These differences are important because education is connected to later economic outcomes. Higher levels of education are associated with higher earnings and employment opportunities (U.S. Bureau of Labor Statistics 2025). Consequently, these distinctions in educational attainment contribute to separation in long-term economic mobility. Such gaps show that differences in family resources and economic circumstances can affect whether an individual is able to access and benefit from educational opportunities. Understanding where these disparities come from can help identify which investments are most effective at improving educational and economic outcomes.

Income not only affects college completion but college enrollment as well. The Pell Institute (2024), using data from the U.S. Census Bureau's Current Population Survey, finds that 78% of dependent 18-24-year-olds from the highest family-income quartile enrolled in college, compared with 46% from the lowest-income quartile. This 32 percentage point gap establishes that lower-income students face barriers to accessing higher education, which can contribute to persistent differences of educational attainment and long-term economic stability.

The National Center for Education Statistics recorded information from the National Assessment of Educational Progress (National Center for Education Statistics 2022), often called “the Nation's Report Card.” It is a nationally representative assessment administered to students across the U.S. It measures subjects such as mathematics and reading. The national average mathematics score for fourth-grade students in 2022 was 236 points. Students attending low-poverty schools had an average score of 253 points, while students attending high-poverty schools had an average score of 230 points. For eighth-grade students, the national average was 274 points. Students attending low-poverty schools had an average score of 293 points, compared with 271 points for students attending high-poverty schools. This represents a 23-point achievement gap between low- and high-poverty schools in both fourth and eighth grade, showing that differences in educational achievement are already evident well before college.

Statistics show that those of higher income are more likely to not only get into college but also complete it as well.Zach Scherer and Michael D. King of the U.S. Census Bureau (2025) found that full-time, year-round workers with only a high-school degree had median earnings of $49,050, compared with $85,810 for those with a bachelor's degree or higher. This implies that higher levels of educational attainment are associated with higher earnings. From 2004-2024, earnings increased 3.2% for high-school-only workers but 6.3% for workers with a bachelor's degree or higher. By 2024, bachelor's degree or higher workers earned 1.8 times as much as high-school-only workers, compared with about 1.7 times in 2004. This shows a trend in the economic difference associated with education has grown somewhat over the past two decades and contributes to a lasting income gap.

The economic benefits of education increase with each additional level of educational attainment. In 2024, full-time workers with a high school diploma had median weekly earnings of $930, compared with $1,543 for bachelor's degree holders and $1,840 for master's degree holders (U.S. Bureau of Labor Statistics 2025). Full-time workers with only a high school diploma earn a median of $1.6 million in lifetime earnings, compared with $2.8 million for bachelor's degree holders, a 75% increase (Carnevale, Cheah, and Wenzinger 2021). The variation in outcomes suggests that substantial economic return is associated with higher education and helps explain why unequal access to educational opportunities can have long-term effects on income and economic mobility.

Although higher education could provide substantial economic return, the cost of attending college can create a significant barrier to accessing this opportunity. For many students, especially those of lower income families, financial constraints can affect the decisions of applying, enrolling, and being able to complete college. Money is a barrier that restricts many from the tasks of applying all the way to completing college. Tuition fees, supplies, housing, food, and many other expenses are all barriers that may come with the price of college and prevent students of lower income families from paying. Therefore, having the opportunity of college is not the same as being financially able to take advantage of it.

Although these barriers can restrict access to higher education, financial aid programs are put in place to reduce these costs and make college more accessible. There are many forms of financial aid, including grants, scholarships, student loans, and work study programs. Grants such as the federal Pell Grant, provide financial assistance to students with financial need and generally do not need to be repaid. Scholarships can also reduce college costs and may be awarded based on financial need, academic achievement, or other criteria. Student loans allow students to borrow money to pay for college but generally must be repaid, while work study programs allow eligible students to earn money through part time employment while attending college. These forms of financial aid are designed to reduce financial barriers that may prevent students from accessing and completing their higher education.

Financial aid can reduce financial barriers by making college more affordable. However, financial resources are not the only barriers that limit access to higher education. Information and advising

interventions can reduce informational or behavioral barriers by helping students understand their options, navigate the college application process, and make informed decisions about pursuing higher education. This matters because different barriers to opportunity may require different types of interventions.

Access to opportunity does not also guarantee that individuals will take advantage of it or persist in pursuing it. Motivation can influence whether individuals chose to invest in an opportunity, while persistence affects whether they continue pursuing it when faced with challenges or setbacks. For example, a student may have access to college and financial aid but still choose not to enroll, underestimate the value of education, or struggle to remain enrolled. Therefore differences in educational and economic outcomes may result not only from whether individuals have access to opportunities, but also from whether they are motivated and able to persist in using them.

Such obstacles do not affect everyone equally because individuals begin with different levels of access to resources and opportunities. Opportunity is not distributed equally, and differences in family circumstances can affect where individuals end up economically as adults. The Panel Study of Income Dynamics (PSID) is a long-running national survey that tracks the same families and their descendants over multiple decades, allowing researchers to directly compare parents' income to their children's income later in life. Using this data, Isaacs (2007) finds that approximately 42% of children raised in the bottom income quintile remained in the bottom quintile as adults, while approximately 39% of children raised in the top quintile remained in the top quintile. Similarly, the Federal Reserve Bank of San Francisco (2013) finds that 44% of children born into the bottom income quintile remained there as adults. The similar results across independent studies indicate that family economic circumstances during childhood can be strongly associated with an individual's economic position later in life, highlighting how unequal starting conditions can shape long-term economic mobility.

Opportunity can also differ based on the environments in which children grow up. Neighborhoods and schools can provide different levels of educational quality, resources, and exposure to economic opportunities. Research on neighborhood mobility has found that children who are exposed to lower poverty neighborhoods during childhood can experience better economic outcomes as adults, while differences in educational achievement between students in low and high poverty schools are already visible before college (Chetty et al. 2016; Chetty and Hendren 2018; National Center for Education Statistics 2022). These differences provide evidence that where a child grows up can affect the quality of opportunities available to them during childhood and influence their later outcomes.

Access to information can create another difference in opportunity. Some students may have the academic ability to pursue valuable higher educational opportunities but lack the information about which opportunities are available or how to pursue them. Research on high-achieving, low-income students has found that many do not apply to selective colleges despite being academically qualified (Hoxby and Avery 2013), while information-based interventions have increased applications and enrollment among some students (Hoxby and Turner 2013). The evidence indicates that unequal access to opportunity can

result not only from differences in money or environment, but also from differences in information or guidance. The documented disparities highlight the need to examine which interventions can most effectively reduce the different barriers that prevent individuals from accessing and benefitting from valuable opportunities.

LITERATURE REVIEW

This systematic literature review examines evidence on interventions designed to expand access to educational, economic, and developmental opportunities. Research was gathered from academic and institutional sources, including Google Scholar, the National Bureau of Economic Research (NBER), the U.S. Census Bureau, the National Center for Education Statistics (NCES), the Pell Institute, the Federal Reserve Bank, and academic journals. Additional studies were identified by examining references cited in relevant papers. Searches focused on terms including opportunity, economic mobility, education inequality, college access, college enrollment, college completion, financial aid, scholarships, information interventions, college advising, mentoring, teacher quality, school quality, neighborhood mobility, early childhood education, motivation, persistence, job training, apprenticeships, workforce development, cost-effectiveness, cost-benefit analysis, and returns to education.

The review includes both foundational and recent studies, prioritizing research measuring educational, behavioral, employment, earnings, and long-term economic outcomes. Studies reporting costs or returns using causal or quasi-experimental methods, including randomized evaluations, and lottery based studies, were prioritized. Studies were organized by intervention type: neighborhoods and environment, information, schools, mentoring, financial access, motivation and persistence, and post-education labor-market interventions. Within each category, studies were compared based on their effects, outcomes, costs, and long-term benefits, with attention to areas of agreement and disagreement and whether differences in results reflected the barriers targeted in each intervention.

Neighborhoods/Environment

The literature identifies several types of interventions that can expand access to opportunity, each targeting a different barrier. Neighborhoods and environmental factors substantially shape children's educational and economic opportunities. A child's outcomes can depend on the community in which they grow up. Neighborhoods differ in schools, poverty, employment opportunities, and social networks, meaning that a child's environment may affect long-term economic mobility. Research by Chetty, Hendren, Katz, and others examines whether these environmental differences affect education and earnings.

Chetty, Hendren, and Katz (2016) examined the Moving to Opportunity experiment, in which low-income families were randomly offered housing vouchers that allowed them to move to lower poverty neighborhoods. Children who moved before age 13 experienced approximately 31% higher adult income

at age 26. This provides strong evidence that changing a child's environment can produce large long-term economic gains, particularly when exposure begins early.

Chetty and Hendren (2018) similarly examined how childhood exposure to different counties affected adult outcomes. Their analysis finds that each additional year in a higher opportunity county increased adult income by approximately 4%, with larger effects for younger children. This supports Moving to Opportunity findings, highlighting that sustained exposure to better environments, rather than moving temporarily, can improve economic mobility.

Chetty, Hendren, Kline, and Saez (2014) and the Opportunity Atlas Chetty et al. (2018) demonstrate how much economic opportunity varies geographically. The 2014 study finds that children from low-income families living in higher-mobility counties had expected income ranks approximately 10-12 percentile points higher than those in lower-mobility counties. The Opportunity Atlas similarly documented substantial differences in adult economic outcomes across neighborhoods, showing that the places where children grow up can provide different levels of access to opportunities that influence their long-term economic mobility. The variation indicates that where children grow up can function as an important opportunity resource, because neighborhood and county conditions can shape their chances of achieving higher economic outcomes.

Kline and Moretti (2014) examine a different intervention: place-based economic development, which targets disadvantaged communities through policies such as tax subsidies, public investment, and incentives for firms to locate in distressed areas rather than moving residents elsewhere. These policies are widely used and involve substantial government spending; in the United States, the federal government spends at least $15 billion per year on spatially targeted development activities, while state and local governments spend an estimated $80 billion per year on incentives to attract investment and reshape the location of economic activity. Kline and Moretti show that the effects of these policies depend on how they are designed and who ultimately benefits. For example, their evidence on the federal Empowerment Zone program, which targeted six of the most distressed urban communities in the United States, found that the program increased local employment and raised the wages of workers who lived and worked in the zones, while population and housing rental rates remained stable. This implies that the program increased earnings in disadvantaged neighborhoods without substantially increasing the local cost of living. Unlike housing mobility interventions, place-based policies can improve economic conditions within entire communities, but their substantial costs and potential distributional effects make their design important. This provides an important contrast to lower-cost individual interventions and suggests that changing the economic environment itself may be valuable when neighborhood conditions are a major barrier to opportunity.

The research reviewed indicates that the environment can influence long-term economic mobility, but studies differ in how environments should be changed. Mobility programs help families move to high opportunity areas, while place-based policies improve disadvantaged communities themselves. The

evidence also shows that timing matters, with younger children benefiting more from longer exposure to better environments. However, these interventions require a substantial amount of resources. Overall, neighborhood interventions may produce large long-term effects, and are very effective but very costly.

Information interventions

The next group targets informational and behavioral barriers. Students may not know an opportunity exists, underestimate its value, misunderstand eligibility, be uncertain about admission chances, struggle with applications or financial-aid forms, or fail to complete required steps. Information interventions address these barriers by making opportunities easier to understand, navigate, and act upon. Because many require relatively few resources, they may also be highly cost-effective. Several studies examine whether relatively simple interventions can change students' educational decisions.

Hoxby and Turner (2013) tested the Expanding College Opportunities (ECO) intervention among high-achieving, low-income students who were qualified for selective colleges but often did not apply. Students received personalized information about colleges matching their qualifications, application procedures, costs, and fee waivers. At approximately $6 per student, the intervention increased selective-college applications by 46% and selective enrollment by 27%, showing that low-cost information can unlock existing opportunities.

Bettinger et al. (2012) tested FAFSA assistance, helping families complete financial-aid forms while providing information about expected aid and college costs. FAFSA completion increased by approximately 40 percentage points, while two-year college attendance increased by about 8 percentage points. Information alone did not produce the same effects, suggesting that administrative complexity was an important barrier.

Castleman and Page (2015) examined personalized text messages, counselors, and near-peer mentors designed to prevent "summer melt," when students who intend to attend college fail to enroll. Related counseling interventions increased enrollment by approximately 3 percentage points overall and 8 to 12 percentage points among low-income students, at roughly 100-200 per student. This suggests that relatively inexpensive support can help students follow through on the opportunities they have already chosen that could benefit their economic future.

Jensen (2010) tested an intervention providing accurate information about the economic returns to education. Students underestimate returns by approximately 75%, while the intervention increased completed schooling by 0.20 years and remaining in school by 4 percentage points. Dynarski, Libassi, Michelmore, and Owen (2018) examined the Kalamazoo Promise, a tuition-guarantee program that reduced uncertainty about future college costs. The program increased college enrollment by approximately 4-7 percentage points and 4 year attendance by 3 percentage points, showing that reducing financial uncertainty can also influence decisions.

Keller, Takács, and Elwert (2022) tested an information intervention providing students with information about college admission standards and requirements. Their goal was to conclude if some students may not apply to college because they do not know enough about what colleges require or whether they are qualified to get in. They found no statistically significant average effect on applications, although applications increased among students who already intended to apply. This contrasts with the stronger effects in several other studies and shows that information alone is not always sufficient.

In sum, these studies address different constraints: Hoxby and Turner (2013) addressed college information and application costs, Bettinger et al. (2012) administrative difficulty, Castleman and Page (2015) follow-through, Jensen (2010) mistaken beliefs, Dynarski et al. (2018) financial uncertainty, and Keller et al. (2022) admission information. While effects vary, the evidence generally suggests that interventions are most effective when matched to the specific barrier preventing students from acting. More importantly, low-cost programs can offer a strong cost-effectiveness advantage. Hoxby and Turner achieved large effects for only $6 per student, while other relatively inexpensive interventions produced measurable enrollment gains. Compared with more resource intensive interventions, low-cost information and behavioral interventions generate substantial improvements in educational access when they directly address the constraint limiting students' decisions.

School

While information interventions seek to change students' decisions by improving their knowledge about educational opportunities and returns, school based interventions expand access to opportunity by improving the quality of the educational environment itself. Access to a school is not enough if students lack strong teaching, effective instructional practices, high-quality curriculum, or sufficient academic support. These interventions therefore target school quality, teacher quality, instructional practices, and early-childhood education to determine whether improving educational environments produces larger academic and long-term economic gains. Unlike information interventions, which are often inexpensive, school based interventions generally require greater resources, making cost-effectiveness an important consideration.

Dobbie and Fryer (2011) tested access to the Promise Academy, a high-performing charter school in Harlem, through a lottery. Students who won admission scored approximately 0.28 standard deviations higher in math, while each additional year at the school increased achievement by about 0.32 standard deviations in math and 0.42 standard deviations in reading. Abdulkadiroğlu et al. (2011) similarly examined admission to high-performing Boston charter schools and found that each year of attendance increased math scores by approximately 0.4 standard deviations and ELA scores by 0.2 standard deviations. The results provide evidence that access to higher-quality schools can produce substantial academic gains.

Chetty, Friedman, and Rockoff (2014) examined teacher quality, measuring whether students assigned to higher-value-added teachers experienced better academic and economic outcomes. They find that higher-quality teachers increased test scores and college attendance, with a one-standard-deviation increase in teacher quality associated with approximately 1% higher lifetime earnings. Fryer (2014) instead tested whether successful charter-school practices could be implemented in traditional public schools, including tutoring, increased instructional time, frequent feedback, data-driven instruction, and high expectations. These practices increased math achievement by approximately 0.2 standard deviations, although effects on reading were limited. Together, these studies indicate that improving school quality does not necessarily require creating entirely new schools, targeted improvements in teaching and instruction can also produce meaningful gains.

Early childhood interventions provide evidence of even longer term returns. Heckman et al. (2010) examined the Perry Preschool Program, a high-quality early childhood education program and found improvements in education, earnings, employment, and other outcomes, producing an estimated 7-10% annual social rate of return. García, Heckman, Leaf, and Prados (2020) similarly examined high-quality early childhood education and estimated a 13.7% annual return and approximately a 7.3-to-1 benefit-cost ratio. These findings suggest that educational investments can generate benefits extending far beyond short-term academic achievement.

Overall, the studies indicate that the quality of an educational opportunity matters, not simply whether students have access to schools. However, they differ in how that quality is improved. Charter schools change the broader educational environment, teacher interventions improve instruction directly, and Fryer's intervention shows that specific practices can improve outcomes without creating new schools. The evidence also highlights an important cost-effectiveness tradeoff. Dobbie and Fryer's Promise Academy costs approximately $19,000 per student per year (Dobbie and Fryer, 2011), making it far more expensive than many other interventions, even though the returns are substantial long-term. In general, school-based interventions can produce large academic and economic gains, but unlike low-cost information interventions, their effectiveness must be weighed against the substantial resources required to improve educational quality.

Mentoring

While school based interventions improve the educational environment itself, mentoring interventions provide students with personalized guidance, academic support, and social assistance to help them navigate that environment. Students may have access to opportunities but still struggle with academic planning, administrative requirements, motivation, persistence, or using available resources. Mentoring and coaching therefore attempt to convert existing opportunities into successful outcomes while also developing students' skills.

Bettinger and Baker (2014) tested personalized college coaching, in which coaches helped students with academic planning, decision-making, and academic and administrative challenges. In a randomized experiment involving approximately 13,555 students, coaching increased college persistence by about 5 percentage points after one year, at approximately $1,000 per student annually. This demonstrates that some students need guidance to successfully use the opportunities they already have, although the relatively high cost makes the size of the persistence gain important for the cost-effectiveness.

Rodríguez-Planas (2012) examined the Quantum Opportunity Program (QOP), combining year-round mentoring, academic tutoring, educational services, life-skills activities, community service, and financial incentives. Among 1,069 disadvantaged students, QOP increased high-school diploma attainment by 5.3 percentage points, postsecondary attendance shortly after the program by 5.0 points, ever attending postsecondary education by 8.5 points in the early twenties and 7.4 points in the mid-twenties, and completing at least two years of college or training by 7.0 points. However, QOP cost approximately $25,000 per participant and produced no significant overall long-term employment effect. Thus, intensive mentoring can increase educational attainment without necessarily producing equivalent long-term economic gains.

Personalized support can also work through direct skill development. Kraft, Blazar, and Hogan (2018) analyzed individualized teacher coaching across more than 60 causal studies and found that coaching improved instructional practices by 0.49 standard deviations and student achievement by 0.18 standard deviations. Fryer and Howard-Noveck (2020) find that three years of high-dosage tutoring involving at least 130 hours per year increased ELA scores by 0.09 standard deviations among Black students, while the average effect on ELA scores was positive but statistically insignificant. Tutoring commonly costs 1,000 to 3,000 per student, while intensive teacher coaching can cost several thousand dollars per teacher annually. These interventions demonstrate that personalized support can improve outcomes by building skills.

The research reviews generally agree that individualized support can help students translate educational opportunities into meaningful outcomes, but they differ in their mechanisms and effectiveness. Bettinger and Baker (2014) establishes that coaching can improve student persistence, while Rodríguez-Planas (2012) shows that intensive mentoring can increase postsecondary attainment. Kraft et al. (2018) and Fryer and Howard-Noveck (2020) support that coaching and tutoring can also improve academic skills. However, the evidence suggests that more intensive programs are not always cost-effective. QOP produced substantial educational gains at a cost of approximately $25,000 per participant but did not improve long-term employment outcomes, while less expensive coaching produced a smaller but measurable gain in persistence.

Mentoring and personalized support are most valuable when students face barriers involving navigation, persistence, or skill development. However, they require more resources than lower cost interventions.

Mentoring can therefore be cost-effective when modest investments address specific barriers, but expensive programs must produce lasting gains large enough to justify their costs.

Financial access

Financial access interventions address a barrier in which students may understand the value of college and know how to navigate the application process but still be unable to afford the costs. Tuition, living expenses, and other expenses can discourage enrollment, influence college choice, and affect completion. Grants, scholarships, and other financial assistance that reduce the cost of higher education and help mitigate these financial constraints.

The importance of this barrier is illustrated by Bailey and Dynarski (2011), who analyzed income-based differences in college enrollment and completion and found that the college-completion gap between the highest and lowest income quartiles increased from approximately 31 to 45 percentage points across birth cohorts. Hoxby and Avery (2013) similarly examined high achieving, low-income students' college choices and found that many did not attend selective colleges despite having the academic qualifications, suggesting that factors beyond cost, such as limited information or guidance, can also affect college choice. The evidence illustrates that both financial and nonfinancial barriers can limit access.

Dynarski (2003) examined need-based grant aid, using a quasi-experimental approach to determine whether additional financial assistance increased college attendance. She found that a $1,000 increase in grant aid increased college enrollment by approximately 4 percentage points. This shows that reducing college costs can change educational decisions. Unlike information interventions, grants provide resources to overcome financial constraints. However, their cost-effectiveness depends on whether educational gains justify the aid provided.

Cohodes and Goodman (2014) examined Massachusetts' Adams Scholarship, a merit-based scholarship that reduced tuition for eligible students attending public colleges. The scholarship increased public-college enrollment by approximately 3-4 percentage points, but reduced enrollment at more selective private institutions and had limited effects on college completion. This suggests that financial assistance can change where students attend without necessarily increasing their overall educational attainment. Lowering the price of one option may therefore shift college choices rather than simply expand access to high-quality opportunities.

The evidence reveals an important distinction between increasing college access and improving long-term educational outcomes. Dynarski (2003) shows that additional grant aid can increase college enrollment, while Cohodes and Goodman (2014) find that financial incentives may have weaker effects on college completion and can alter students' college choices in unintended ways. Thus, the studies generally agree that financial assistance can reduce barriers to college enrollment, but they differ in how strongly these interventions improve broader educational outcomes. A key counterargument is that simply making

college more affordable does not guarantee that students will choose higher-quality institutions or complete more education.

Financial interventions are more expensive than information interventions. Hoxby and Turner (2013) information intervention increased selective-college applications by 46% and enrollment by 27% for about $6 per student, while Dynarski (2003) found that a $1,000 increase in grant aid increased enrollment by about 4 percentage points. Information may therefore be more cost-effective when financial constraints are not binding, but it cannot address genuine inability to pay.

Financial aid is most effective when cost is the binding constraint. Though its benefits must justify its higher cost. Grants can increase enrollment, while merit scholarships may primarily affect college choice. Therefore, information is preferable when knowledge is the barrier, while financial assistance is necessary when affordability prevents access

Motivation

Motivation, expectations, and persistence can determine whether students actually take advantage of educational opportunities. Even when students have access to schools, financial aid, or information, they may not act if they underestimate their potential, do not believe education will pay off, or struggle to persist. Motivation-based interventions therefore attempt to change beliefs and behavior rather than simply provide resources. Research by Duckworth et al. (2007), Yeager et al. (2019), Jensen (2010), Nguyen (2008), and Thaler and Sunstein (2008) examines whether changing expectations, beliefs, and decision-making can improve educational outcomes.

Duckworth et al. (2007) examined grit, or perseverance toward long-term goals, using students, military cadets, adults, and spelling-bee competitors. Rather than testing an intervention, they measured whether grit predicted achievement and found that grit accounted for an average of approximately 4% of the variance in success outcomes and predicted West Point retention even after accounting for SAT scores and other characteristics. This suggests persistence is an important mechanism through which students convert opportunities into outcomes, although the study does not establish that growth itself can be easily changed.

Yeager et al. (2019) tested a growth-mindset intervention that taught ninth-grade students that intelligence can develop through effort and learning. In a randomized experiment involving approximately 12,490 students across 65 schools, the intervention increased GPA by approximately 0.10 points in supportive schools, with stronger effects among lower-performing students. This provides evidence that changing beliefs can improve achievement, although the smaller effects in unsupportive schools show that motivation cannot fully overcome poor environments.

Jensen (2010) tested an information intervention about the economic returns to education, giving Dominican eighth-grade students information about how additional schooling affects future earnings. Jensen finds that students substantially underestimated the returns to secondary schooling. The intervention increased the probability of returning to school the following year by about 4 percentage points and increased completed schooling by approximately 0.20 years over the following four years. Nguyen (2008) similarly examined how information about the returns to education and educated role models affect schooling behavior. The statistics intervention caused households to update their perceived returns toward the information provided and increased test-score improvement by 0.20 standard deviations, with a 3.5 percentage-point increase in student attendance. These findings, alongside Jensen's results, suggest that changing expectations about the value of education can encourage greater educational investment at relatively low cost.

Overall, the studies indicate that access alone is insufficient if students do not see opportunities as valuable or fail to persist. Jensen and Nguyen show that expectations can change educational investment, while Yeager shows that beliefs about ability can improve achievement. However, Yeager's effects depended on supportive school environments, and Duckworth measured grit rather than showing it can be increased. Thus, motivation interventions may complement rather than replace financial, information, or educational interventions.

From a cost-effectiveness perspective, information, mindset, and behavioral interventions generally require the least amount of resources while producing measurable effects (Hoxby and Turner 2013; Jensen 2010; Thaler and Sunstein 2008). However, their effects are generally smaller and more context dependent than interventions addressing major financial or environmental constraints. In general, low-cost interventions can improve how students perceive and use opportunities, but their greatest value comes when they complement rather than substitute for high-quality affordable opportunities.

Labor market

While earlier interventions expand educational opportunity, post education interventions help individuals convert education and skills into employment and economic opportunity. Even after completing school, people may lack job market information, employer connections, relevant skills, or support navigating employment. Job training, apprenticeships, job search assistance, and workforce development therefore extend opportunity beyond formal education.

Schochet, Burghardt, and McConnell (2008) evaluated Job Corps, an intensive program providing disadvantaged young adults with vocational training, academic education, counseling, and employment assistance. Participants received about 1,000 additional hours of education and training, increasing GED attainment by 20.9 percentage points and vocational certificates by 30.9 percentage points. Fourth-year earnings were approximately $1,150 higher annually, but the program cost about $16,500 per participant,

and earnings gains largely disappeared in later administrative data. Thus, Job Corps increased skills and credentials but produced limited long-term gains relative to its cost.

Reed et al. (2012) examined registered apprenticeships, which combine structured on-the-job training with related technical instruction tailored to industry needs. They find that apprenticeship participation was associated with an average $6,595 increase in annual earnings in the sixth year after enrollment, compared with nonparticipants. Over a 36-year career, the study estimated $124,057 in average net social benefits per participant under its baseline assumptions. However, the authors caution that their research design did not conclusively identify the causal effect of apprenticeship participation on earnings. Even under a more conservative scenario in which only half of the estimated earnings gain was attributed to apprenticeships, the study estimated $61,596 in net social benefits over an apprentice's career. The evidence suggests that apprenticeships can generate substantial long-term economic benefits by connecting training directly to employment, although the estimated benefits should be interpreted with caution.

Crépon et al. (2013) tested personalized job-placement assistance for young, educated unemployed workers in France, helping participants improve their job search and connect with employment opportunities. After eight months, workers assigned to the program were 1.7 percentage points more likely to obtain a fixed-term contract lasting more than six months than unassigned workers across all areas, and 2.3 percentage points more likely than unassigned workers in areas where the program was offered. However, these gains were temporary and partly came at the expense of other unemployed workers, particularly in weaker labor markets. The authors finds that the employment effects had disappeared by 12 months and concluded that, after accounting for these displacement effects, the program generated very little net benefit relative to its cost.

Autor (2015) provides evidence for why skill development and workforce adaptation matter in a changing labor market. He finds that professional, technical, and managerial occupations, the highest-skill occupational categories, grew by about 3 percentage points per decade from 1980 to 2010, while many middle-skill occupations declined. Autor argues that technological change increases the value of workers whose skills complement new technologies and concludes that human-capital investment, education, and job training are central to helping workers develop skills that are complemented rather than replaced by technological change.

Babcock et al. (2012) reviewed behavioral insights into labor-market policies, including employment services and job-search assistance designed to address barriers such as procrastination, complexity, and biased wage expectations. They report that evidence from a wide range of evaluations shows that employment services and job-search assistance typically help individuals obtain employment more rapidly and can raise earnings in the short run. Because these services are relatively inexpensive to provide per participant, they are generally found to be cost-effective. Card, Kluve, and Weber (2018) provide broader evidence from 207 studies and 857 estimates, finding that active labor-market programs

increased employment by approximately 1.6 percentage points in the short run, 5.4 points in the medium run, and 8.7 points in the long run. Training programs were particularly effective over longer periods.

Together, the studies show that opportunity must extend beyond formal education, but interventions differ substantially in their costs and effectiveness. Apprenticeships can produce strong long-term returns by combining training with employer connections, while Job Corps produces larger educational gains but weaker long-term earnings effects despite its high cost. Job-search assistance can help workers obtain employment more quickly and may be relatively inexpensive, but Crépon et al. (2013) shows that its net benefits can be limited when displacement effects are considered. Card et al. (2018) also show that training effects may grow over time, cautioning against judging programs solely by short-term results. Cost-effectiveness therefore depends on the barrier being addressed: job-search assistance may be most useful when workers have the necessary skills but lack information or effective job matching, while apprenticeships and training are more appropriate when skill gaps are the primary constraint. Education alone is therefore insufficient; individuals also need pathways that translate skills into employment and lasting economic gains.

DISCUSSION

Evidence on information-based interventions implies that the most cost-effective interventions depend on the barrier being addressed rather than simply the size of the intervention effect. Low-cost interventions appear particularly valuable when students already have access to useful opportunities but face information or administrative barriers. For example, Hoxby and Turner's (2013) college-information intervention cost approximately $6 per student and increased selective-college applications by 46% and enrollment by 27%. Similarly, Jensen (2010) found that an information intervention increased completed schooling by 0.20 years and school persistence by 4 percentage points. Bettinger et al. (2012) further show that when the barrier is administrative complexity, FAFSA assistance can be more effective than information alone, increasing FAFSA completion by approximately 40% and two-year college attendance by 8%. However, Keller, Takács, and Elwert (2022) found no statistically significant average effect from providing information about college admission standards. Thus, information is not automatically cost-effective; its value depends on whether it addresses the specific binding constraint.

More intensive interventions can generate larger long-term benefits when the underlying educational or environmental opportunity is itself inadequate. Early childhood programs, high-quality schools, and neighborhood interventions require greater resources but can produce substantial long-term effects. Heckman et al. (2010) estimated annual returns of approximately 7-10% for high-quality early childhood programs, while García et al. (2020) estimated a 13.7% annual return for a high-quality early childhood program. Chetty, Hendren, and Katz (2016) find that children who moved to lower-poverty neighborhoods before age 13 experienced approximately 31% higher income at age 26. Registered apprenticeships also produced approximately $6,595 in additional annual earnings and an estimated $124,057 in average net social benefits. In contrast, Job Corps costs approximately $16,500 per

participant Schochet, Burghardt, and McConnell (2008) . Although the program initially increased earnings, these gains largely disappeared over time, limiting its long-term cost-effectiveness. Therefore, the largest or most expensive intervention is not necessarily the most cost-effective. The strongest return comes from matching an intervention's cost and intensity to the size and persistence of the barrier it addresses.

The evidence supports a life cycle approach, because different barriers emerge at different stages of life. Early-childhood education and neighborhood interventions can influence development and economic mobility from an early age. High-quality schools and teachers can strengthen human-capital development during K-12 education. Information, FAFSA assistance, financial aid, and mentoring can help students convert that preparation into college enrollment and persistence. After education, apprenticeships, training, and job-search assistance can help individuals convert education and skills into employment and earnings. Earlier interventions may have particularly large long-term effects because they influence later opportunities, but the evidence does not show that earlier is always more cost-effective. A later intervention can produce a very high return when it removes a specific, inexpensive barrier.

Interventions can also be complements or substitutes, depending on whether they address different or overlapping barriers. Interventions are likely to complement one another when each removes a different constraint in the opportunity process. For example, information can help a student identify and apply to college, financial aid can remove affordability barriers, and mentoring can help the student navigate college and persist. Because each intervention addresses a different stage or barrier, combining them could allow the benefits of one intervention to increase the effectiveness of another. In contrast, interventions addressing the same barrier may be substitutes because once the primary constraint is removed, an additional intervention may provide little additional benefit. For example, providing multiple forms of the same college information may have less value than combining information with financial or administrative assistance when those are the remaining barriers. The evidence reviewed therefore suggests that complementary interventions may be most valuable when barriers accumulate across stages, but the literature does not provide enough direct evidence to determine exactly how much additional benefit combinations produce. This is an important area for future research.

These findings lead to several policy recommendations. Governments should first identify the binding constraint before deciding where to invest. Information and administrative assistance should be prioritized when students have opportunities available but lack knowledge or struggle with complex processes. Financial aid should be targeted toward students for whom affordability is the primary barrier. Mentoring should be used when navigation or persistence is limiting progress. Larger investments in early-childhood education, high-quality schools, and neighborhoods are more appropriate when the quality of the educational or physical environment itself limits opportunity. Apprenticeships and targeted workforce programs appear especially valuable when the goal is to translate education into employment and earnings. Individual-level interventions may be preferable when a specific barrier can be cheaply

removed, while place-based interventions must be justified when the environment itself is the fundamental constraint.

Several limitations make it difficult to identify one universally "best" intervention. The studies examine different populations and measure different outcomes, including test scores, enrollment, persistence, graduation, earnings, and lifetime economic mobility. Intervention costs are also reported differently, making direct cost benefit comparisons difficult. In addition, long-term outcomes are not consistently measured, so short-term improvements cannot always be assumed to produce lasting economic gains. Differences in program design, location, and implementation further limit direct comparisons. This review can therefore identify broad patterns in effectiveness and cost-effectiveness but it cannot definitively determine which intervention is the best in every setting.

Further research should provide more consistent measures of cost, long-term earnings, educational attainment, and economic mobility so that interventions can be compared more directly. Research should also examine whether combinations of complementary interventions produce larger benefits than individual programs and whether early investments increase the effectiveness of later interventions. More evidence is also needed on when interventions become substitutes and produce fewer additional benefits because they address the same barrier.

Opportunity-expanding investments are most cost-effective when they target the specific barrier preventing individuals from converting an existing opportunity into improved outcomes. Low-cost information, administrative assistance, and behavioral interventions can generate particularly large gains in motivation, persistence, and educational investment per dollar when relatively inexpensive barriers prevent individuals from using opportunities that already exist. However, when deeper barriers to human capital or the quality of the opportunity itself exist, more intensive investments in early childhood education, high-quality schools, neighborhoods, and skill development can generate larger long-term improvements in economic mobility, despite higher upfront costs. The greatest return per dollar therefore depends on the barrier being addressed: low-cost interventions tend to have the highest cost-effectiveness when the opportunity already exists, while larger investments are justified when changing the quality of the opportunity or environment is necessary.

CONCLUSION

This review finds that the most cost-effective opportunity-expanding investments are those that target the specific barrier preventing individuals from benefiting from an existing opportunity. Low-cost information, administrative assistance, and behavioral interventions can produce substantial gains in motivation, persistence, and educational investment when these are the main constraints, while larger investments in early childhood, schools, neighborhoods, and skill development are more appropriate when the quality of the opportunity itself is limiting long-term mobility. Expanding opportunity across multiple stages of life is important because barriers can emerge at different points, from childhood development

and education to college access, persistence, and entry into the labor market, and interventions at one stage can complement investments at another. Therefore, policymakers should identify the binding constraint and match the size and type of investment to it, using low-cost interventions when they are sufficient and larger investments when deeper barriers require them.

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