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What Can Be Done To Improve Struggling High Schools?

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The task faced by high schools is perhaps the most difficult in all of education. High schools not only are charged with preparing students for college, but also with serving the needs of the many students who will directly enter the workforce. High schools have to offer greater portfolios of options and sort students appropriately across those options. At the same time, compared with lower grade levels, high schools inherit student bodies with more discrepant abilities and competing outside options and influences (for example, Clotfelter, Ladd, and Vigdor 2009; Cascio and Staiger 2012). The balancing act is all the more challenging at disadvantaged high schools, where resources are of lower quality and more scarce.

The National Center for Education Statistics (Aud et al. 2012) provides a wealth of data showing that many US high schools are struggling. Across all public schools, only around 75 percent of students graduate on time, and approximately 8 percent of students drop out of high school altogether. In large urban school districts, like Chicago, New York City, and Los Angeles, cohort graduation rates hover around 60 to 65 percent. In the lowest income quintile, dropout rates are four times greater than in the highest income quintile. These statistics are especially shocking since

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dropping out of high school has increasingly become an economic death sentence.[1] A comparison of those who receive exactly twelve years of education versus those who stop just short of receiving a high school diploma yields a $300,000 difference in lifetime earnings, according to our calculations based on data from the 2010 American Community Survey.

In this paper, we suggest that underperforming high schools are failing in large part because traditional paradigms do not meet the needs of many of their students. The majority of high schools have sought to provide all students with academic skills from a primarily college-preparatory and nonexperiential perspective, with limited nonacademic supports. This mission has received renewed emphasis under the recent national school accountability movement. Yet, this emphasis is likely setting many high schools up to fight a losing battle, because a higher proportion of students from disadvantaged backgrounds lack the requisite skills to succeed by this definition. Test score gaps are around 0.7 standard deviations for minority students entering and exiting high school, and are equally large in subject areas like English and math (that are most often the focus of interventions) as in areas like history and science (Fryer 2011b). While increasing school inputs in failing schools or shifting disadvantaged students to high-performing schools have had limited effects on student outcomes, efforts to engage low-performing students through changes in the types of schools and classes available to these students appear to result in large gains in graduation rates and labor market outcomes.

In essence, our advice to high schools when it comes to underperforming students is to redefine the mission and eschew traditional success metrics like test scores, focusing instead on more pragmatic objectives like keeping kids out of trouble, giving them practical life skills, and helping with labor market integration. That conclusion will no doubt be unsatisfying to many readers. In an ideal world, high schools would perform miracles, bringing struggling students back from the brink and launching them towards four-year college degrees. Indeed, a few remarkable and innovative schools seem to be succeeding at that lofty objective. We discuss these programs, which offer a stark alternative to technical education, but with the important caveat that we are skeptical that these achievements can be generalized on a large scale. More likely, attempts to do so would be extremely costly and largely ineffective.

A fundamental question, even if one accepts the conclusions of the preceding paragraph, is how best to organize the delivery of these services. The success of vocational programs would seem to be especially dependent on a good match between students' interests and abilities and the types of career programs offered. One model is to create stand-alone career academies organized around a specific career theme. That approach has attractive features from an economies-of-scale perspective and will work well if the right kinds of students are willing to travel substantial distances to attend. A second vocational model is a "school within a school" model that injects

[1] Murnane (2013) provides a comprehensive review of the dropout problem, including evidence on how incentives to invest in education have evolved over time and on the effectiveness of interventions at different ages, including some of the high school interventions considered in this paper.

vocational options into schools that emphasize more traditional academic goals. The risk of this approach is that the range of vocational opportunities offered is likely to be limited at any one school, and good match quality may then be harder to achieve.

In fact, the quality of the match between students and high school programs, in our view, is the most critical issue facing high school reform today. Focusing policy on changes in resources may be effective in early grades, where there is potential for such investments to improve students' cognitive and noncognitive skill levels and trajectories. In contrast, the area of reform with the largest potential to improve high school outcomes like graduation is to provide struggling students with an increased variety of targeted educational models and schools (Jacob and Ludwig 2008; Murnane 2013). The most hopeful results have been seen in this area.

In this paper, we begin with a selective overview of the evidence regarding the effectiveness of standard school inputs in overcoming gaps in outcomes at the high school level. The key lesson that we highlight is that changes in school quality, retaining traditional models, do not appear to be adequate. We turn to the case for alternative models that emphasize the development of pragmatic job skills. We then consider models with loftier goals, such as KIPP and Harlem Children's Zone. We conclude with reflections on the most promising directions for research and reform.

Standard School Inputs—Vertical Differentiation

One way to view failing high schools is through the lens of a common high school education production function. Among the wide array of factors influencing student outcomes are capital and labor inputs, including administrators, teachers, and peers, along with the design and rigor of the curriculum. The level and quality of these inputs vertically differentiate schools, and low-performing high schools tend to rank poorly on these dimensions. The US Department of Education's *Toolbox Revisited* (Adelman 2006) documents that higher socioeconomic students have access to more-rigorous high school curricula; for instance, 72 percent of 1992 high school seniors in the highest quintile by socioeconomic status attended schools offering calculus compared to just 44 percent in the lowest quintile. Of students whose 5th-grade math scores placed them in the top half, 26 percent of African-Americans took Algebra I or another advanced math course in the 8th grade, while 60 percent of their white peers were enrolled in these courses (Ross et al. 2012). Low-income and minority students are also exposed to teachers with less experience and fewer qualifications than higher socioeconomic students (Lankford, Loeb, and Wyckoff 2002). In California, for example, students in the bottom income quartile have math and science teachers with an average of three fewer years of experience than do students in the top quartile (Socias, Chamber, Esra, and Shambaugh 2007). Even the conditions under which these students study vary greatly. Minority students are more likely to attend schools with trash on the floor, graffiti, and chipped paint (Planty and DeVoe 2005).

Evidence on Specific Inputs

Would increasing standard school inputs be sufficient to eliminate the wide gulfs in results between low-achieving and high-achieving high schools? The first step in responding to this question is to establish causal ties between these inputs and student outcomes, both overall and for disadvantaged students. Unfortunately, there is a dearth of evidence on the productivity of specific school inputs at the high school level. While the body of evidence on the role of inputs such as class size and teacher quality in earlier grades continues to expand, most studies relying on quasi-experimental methods exclude high school students. Often, the justification behind focusing analysis on lower grades is that the production process in high school is too complex, given that high school students take different sets of courses and are taught by teams of teachers. While this argument makes sense based on the desire of researchers to have clear identification strategies, it also leaves important gaps in the empirical evidence.

One result that does stand out from the existing literature is that increasing the overall level of resources is a blunt instrument for helping at-risk students. Perhaps the best evidence on this comes from the school finance equalization movement, which greatly mitigated disparities in resources across school districts. By exploiting variation in the timing of states' adoption of finance equalization policies, Card and Payne (2002) show that these policies erase only about 5 percent of the gap in SAT scores between high- and low-income students, with 95 percent remaining.

The limited evidence regarding capital inputs is equally discouraging. Though broader upgrades to high school facilities might matter, attempts to address the digital divide have not seemed to make much difference. Goolsbee and Guryan (2006) estimate the impact of a federal subsidy program on Internet investment across California schools from 1996 to 2000. Despite dramatic improvements in accessibility, particularly for the disadvantaged high schools that were assigned larger subsidy rates, they find little effect on student achievement. It may be that it is not the presence of computers, but rather the ability of computer-aided instruction to provide individualized lessons, that will offer the real payoff. For example, analyzing a randomized experiment implemented in three school districts in 2003 and 2004, Barrow, Markman, and Rouse (2009) find some evidence that computer-aided instruction in algebra and pre-algebra for 7th–9th graders improved student outcomes, especially in large classes.

Labor inputs, and in particular the quality of personnel, appear more important. More-effective principals have a positive impact on student test scores, but high-poverty schools have a large variance in principal quality (Brewer 1993; Branch, Hanushek, and Rivkin 2011). High value-added principals may be successful in part because they are particularly effective at selecting high-quality faculty and firing failing teachers. After a policy change in Chicago gave principals greater freedom to dismiss faculty, Jacob (2011) found that principals did use some measures of teacher productivity in making firing decisions. Productive teachers have been shown to increase graduation rates among students on the margin (Koedel 2008) and to be particularly valuable to students coming into high school with academic deficits.

For instance, Aaronson, Barrow, and Sander (2007) demonstrate that having a math teacher one standard deviation above average results in a 0.13 grade equivalent improvement in average test scores for low-ability 9th graders, explaining approximately one quarter of the improvement in test scores over the year.

Unfortunately, recruiting and retaining high-quality teachers at schools serving disadvantaged students may prove especially difficult (Lankford, Loeb, and Wyckoff 2002; Clotfelter, Ladd, Vigdor, and Wheeler 2007). An alternative to reallocating teachers is to offer incentives to existing teachers. While most evaluations of performance pay have not found positive effects in US high schools, recent studies reveal that small tweaks to the way incentives are structured can greatly impact their effectiveness. Fryer, Levitt, List, and Sadoff (2012) found that K–8 classrooms in which teachers received performance bonuses upfront, which they then had to return if student achievement did not improve enough, saw math gains equivalent to a one standard deviation increase in teacher quality. To get longer-term boosts in effort and grades, Levitt, List, and Sadoff (2012) found that deferred financial incentives offered either to students or to parents combined with personal "cheerleading" can work. Putting these bonus schemes into widespread operation, however, is no easy task.

Another important labor input that is not directly compensated and is perhaps even harder to manipulate is peer quality. Within high schools, the characteristics of classmates tend to be correlated with the level of coursework because of the common practice of tracking, making it difficult to tease out the role of peers. Though there has been a push to remove tracking from the typical high school model, research estimating the combined effects of peers and coursework suggest that concerns about increased inequality with tracking are unfounded. For example, Betts and Shkolnik (2000) and Figlio and Page (2002) find no relationship between tracking and outcome gaps in national samples of middle and high school students from the Longitudinal Survey of American Youth and the National Educational Longitudinal Study, respectively. In fact, Figlio and Page (2002) find that tracking may improve math scores for lower-performing students.

More direct evidence on the role of access to and participation in advanced coursework per se is more mixed. Several studies that exploit changes in graduation requirements show that increasing the number of required math courses decreases the wage gap between disadvantaged and middle-income students (Altonji 1995; Betts and Rose 2004; Goodman 2012). Yet the more prevalent exit exams and rigorous credit requirements embedded in states' school accountability systems as a result of the No Child Left Behind legislation have had the opposite effect on low-ability students than was intended, as these students are induced to drop out at higher rates (Dee and Jacob 2007; Papay, Murnane, and Willett 2010).

Evidence from Reassigning Students across Traditional Public Schools

Given the limited evidence on the efficacy (and heterogeneity in the efficacy) of specific inputs and the difficulty of aggregating results from studies that pull one lever at a time, the most convincing evidence on whether replicating high-performing high schools would be sufficient to eliminate gaps comes from

reallocations of students across traditional schools. Open enrollment allows us to approximate this thought experiment. Under open enrollment, students are allowed to apply to any public school in the school district. Depending on how prevalent charter and magnet schools are, this strategy retains the traditional structure of public schools, but allows students who might otherwise attend low-performing neighborhood schools access to higher-performing alternatives.

An aspect of open enrollment that facilitates analysis is that schools that are oversubscribed typically admit a subset of interested students through a lottery. An associated limitation, though, is that the least advantaged students tend not to participate, so any findings may not extrapolate to them. For example, Cullen, Jacob, and Levitt (2005) document that three-quarters of rising freshmen from the top quartile of the ability distribution opt out of their neighborhood schools within the Chicago public schools, while only one-third of students from the bottom quartile do. Similar patterns are found in Charlotte-Mecklenburg, which also now has a well-established open enrollment program with high overall rates of participation (Deming, Hastings, Kane, and Staiger 2011).

Though students participate in the lotteries at high rates, the evidence for academic benefits from attending a high- rather than low-performing high school is not there. Among applicants to oversubscribed high schools, Cullen, Jacob, and Levitt (2006) find little to no effect of gaining access to a higher-achieving high school on academic outcomes, suggesting differences in outcomes across schools are driven by differences in student caseloads rather than inputs. Even when taking heterogeneity in student populations into account, there is little evidence that benefits accrue to different subsets of students, such as those students who face the greatest potential gains from attending a lottery school (for example, those students who attend schools with higher-quality peers than their next-best option). In fact, among those students, the likelihood of dropping out increases by nearly 11 percentage points in comparison to their peers who did not win the lottery.

In current work on the Charlotte-Mecklenburg schools, Deming, Hasting, Kane, and Staiger (2011) find similarly weak support for academic gains to attending a higher-performing high school on average, with null effects for test scores and college enrollment and an approximately 5 percent rise in high school graduation. The authors do emphasize that these average effects mask heterogeneous impacts. Strikingly, lottery winners who otherwise would have attended one of the four lowest-quality high schools experience no gain in 9th grade test scores but were 9 percentage points more likely to graduate high school and about 6.5 percentage points more likely to attend a four-year college.

In interpreting their findings, it is important to realize the treatment applied to this subgroup does not align with our thought experiment (where we simply increase standard school inputs). Only 15 percent of lottery applicants from the four lowest-quality high schools were effectively randomly assigned and so were included in the analysis, and more than two-thirds of the winners who took up the offer chose to attend one of the three district-wide magnets. These magnets have career and technical emphases, so these findings accord with Cullen, Jacob,

and Levitt (2005), who find that positive returns were seen only for those students attending vocational schools. Students who attended vocational high schools were on the order of 15–20 percentage points more likely to graduate than their peers in other school models. Our view is that this vocational focus is key, and we return to this issue below.

Evidence from Restructuring Struggling High Schools

A possible explanation for why the typical "good" school does not improve outcomes for students opting out of "bad" schools is that such students might require specialized supports. Whole school reform models and small school initiatives seek to take the lessons learned about the relative importance of personnel, peer, and capital inputs in order to provide a more targeted education for low-achieving students. Both have delivered mixed results.

Whole school reform models are efforts that provide incentives for dramatic changes in personnel and policies and provide additional funding for wrap-around supports services for students. As part of the economic stimulus package enacted in 2009, the federal government greatly expanded the Title I School Improvement Grants subprogram. These new grants (of up to $2 million per year) were awarded to school districts according to the prevalence of low-performing schools and required adopting federally sanctioned school reform models. Comparing those barely eligible versus ineligible reveals that receipt does appear to have some positive effects on performance for the lowest-performing California high schools that replaced the school leader and most of the staff (Dee 2012). Improvements were uneven, though, across chosen models and targeted schools.

The small schools movement reorganizes large high schools into smaller autonomous schools in order to provide more-cohesive sets of teachers and peers and individualized attention. Several of these initiatives have been successful. For instance, a study of lottery participants applying to around 100 public small schools in New York City revealed that attendees experienced increases in the likelihood of graduating within four years of 8.6 percentage points (Bloom and Unterman 2012). In Chicago, Barrow, Claessens, and Schanzenbach (2013) also find that students in small schools are more likely to graduate, despite no signs of improvements on test scores. Results have been varied, though, and the movement that was once championed by the Bill Gates Foundation has since been largely dismissed. One of the issues is that small schools differ in their specific missions and the degree to which they adhere to the tenets. As in the case of open enrollment, it may be that it is the subset of small schools with career and technical missions that drive the results, which would imply that size is of second-order importance.

Alternative Models—Horizontal Differentiation

The bulk of the evidence discussed in the preceding section suggests that more inputs, structured in the usual fashion, or that access to high schools in other

neighborhoods are unlikely to yield dramatically improved outcomes for struggling high school students. One limitation that students and families face is a dearth of different school models from which to choose. The majority of districts continue to provide access primarily to traditional, college-preparatory schools, with 80 percent of public high schools providing a traditional education (Snyder and Dillow 2012). Potential gains from match quality would be realized by providing a range of schooling options that better fit students' needs. Reviewing the literature across all grade levels, Jacob and Ludwig (2008) similarly conclude that expanding the school choices available to students and families can only help currently underserved students. In fact, in recent years, two nontraditional educational models in particular have emerged that have shown hopeful results.

The first of these can be viewed as capitulation or as realism: in either case, a recognition that students entering high school with low skills and little academic motivation are likely better served by a vocational model. The second approach is what one might call the Herculean effort strategy: radical programs that go beyond standard academic approaches, emphasizing noncognitive skills and social pressure to achieve, to sharply change students' motivations and goals. Beyond these two paths, the only other obvious answer is educational improvements earlier in life so that the gaps facing high schools are less daunting.

Vocational Focus

High schools and programs with a specialized focus can help the disadvantaged students who choose them by both playing to their interests and by overcoming informational and network deficits. Of the 70 percent of high school completers who enroll in two- or four-year colleges right after high school, only around 40 percent enroll in a four-year degree program, and only 60 percent of these students will graduate in six years or less. Among schools with open admissions policies—where the lowest ability students will likely enroll—graduation rates are half that, at 29 percent. Graduation rates at two-year institutions are equally low, with only 30 percent of enrolled students graduating within three years (Aud et al. 2012). For large numbers of high school students, preparing for a two- or four-year university does not match well with their trajectories.

A career-oriented track can potentially improve outcomes for low-achieving students on the margin of dropping out of school if it provides technical skills valued by the market and/or pushes them over the margin of enough perceived gains from schooling to avoid dropping out. While a college degree does offer high labor market returns, many growing and relatively profitable industries require only a high school degree. Table 1 shows average 2010 earnings of high school graduates (excluding those with any education beyond high school) and dropouts 35 to 44 years of age, by broad industry categories. Compared to people who have an 11th or 12th grade education but no diploma, high school graduates earn more across all industry categories. The returns to a high school degree are particularly high in areas that demand sector-specific skilled labor. While business and manufacturing and production continue to employ the majority of individuals with a

Table 1

Average 2010 Earnings of High School Graduates (Excluding Those with Education beyond High School) and Dropouts Ages 35 to 44 by Industry Category
(number of observations in parentheses)

	Graduates		*Dropouts*	
	Male	*Female*	*Male*	*Female*
Food & maintenance	$24,866 (441,746)	$16,271 (430,399)	$20,758 (102,280)	$14,712 (98,423)
Community & education	$29,406 (97,368)	$21,294 (570,649)	$22,745 (14,923)	$18,344 (78,000)
Manufacturing & production	$37,546 (2,406,371)	$23,481 (378,185)	$29,611 (419,210)	$20,177 (68,814)
Military & law enforcement	$45,616 (130,426)	$33,284 (39,284)	$37,659 (5,392)	$25,935 (3,473)
Business	$46,223 (901,278)	$29,907 (1,410,816)	$37,289 (100,523)	$23,935 (122,442)
Technology	$53,452 (122,519)	$35,268 (121,897)	$40,891 (9,476)	$31,826 (7,331)

Notes: Average earnings are estimated using the 2010 American Community Survey Public Use Microdata Sample (ACS PUMS). The first two columns show earnings for people who received a regular high school diploma (but no further schooling) and report annual earnings greater than $1,000. The third and fourth columns show earnings for people who received an 11th or 12th grade education but no diploma and report annual earnings greater than $1,000. The 2010 ACS Occupation Codes were used to categorize industries. "Business" includes management, business, science, and art, business operations specialists, financial specialists, legal, office and administrative support, and sales and related occupations; "Community & education" includes education, training, and library, and community and social services, healthcare support, and personal care and service; "Food & maintenance" includes food preparation and serving, and building and grounds cleaning and maintenance; "Manufacturing & production" includes construction and extraction, extraction workers, installation, maintenance, and repair, transportation and material moving, and farming, fishing, and forestry; "Military & law enforcement" includes military-specific occupations and protective service occupations; and "Technology" includes healthcare practitioners and technical, computer and mathematical, architecture and engineering, life, physical, and social science, and arts, design, entertainment, sports, and media.

high school diploma, technology appears to be a largely untapped potential field with relatively high income. Among 35 to 44 year-old males, graduates who work in the tech industry earn on average more than $50,000—or $7,000 more than high school graduates in business and over $10,000 more than high school dropouts in the same field. Those in food and maintenance and in community and education jobs, which tend to require unskilled labor, fare the worst, with women in food and maintenance making under $15,000 annually.

Evidence suggests that career-oriented programs improve both attainment and market-valued skills. In their analysis of career and technical magnet schools in New York City, Crain, Heebner, and Si (1992) find significant improvements in high school enrollment and graduation. This accords with the gains in graduation rates found by Deming, Hastings, Kane, and Staiger (2011) and Cullen, Jacob, and Levitt

(2005) under open enrollment, which in both cases are driven by such magnets. Beyond increasing graduation rates, there is some evidence that schools may also funnel students into vocational fields and classes, such as technology, that can particularly benefit them in the labor market. Bishop and Mane (2004) survey an array of evidence that suggests significant labor market returns to computer classes taken in school.

Most students have access to some vocational education. Around 80 percent of all high schools in 2008 offered career or technical courses, which include everything from business and computer classes to more-traditional high school classes like shop and home economics. But there are likely large differences between the majority of schools that provide some vocational courses within a college-prep centered curricula and schools like the magnet schools found to have sizable impacts that offer vocational tracks. In fact, while over 90 percent of students graduate with vocational credits, only a little over 20 percent complete an occupational concentration (Levesque, Laird, Hensley, Choy, Cataldi, and Hudson 2008). Enrollment in dedicated vocational schools has decreased from around 190,000 students in the 2000–2001 school year to approximately 125,000 in 2009–2010, despite an increase in the number of vocational schools from around 1,000 to over 1,300 (Snyder and Dillow 2012).

Given the evidence above, it seems likely that existing programs, on average, are undersubscribed. Why is there such low participation in vocational programs despite their potentially high returns? One reason may be lack of easy access to these schools. There is strong evidence that even under open enrollment, students lean heavily toward attending nearby schools (Cullen, Jacob, and Levitt 2005). Furthermore, information likely plays an important role in matching students to the correct educational model (Hastings and Weinstein 2008). If families live far from vocational options or do not know what those options are, students are unlikely to enroll in these programs. Furthermore, even in districts where vocational programs are in high demand, such as Chicago, many students who may benefit from a vocational education may not apply to these schools for these same reasons. In Chicago, for example, just 11 of 106 public high schools are vocational high schools, and while a centralized website provides a wealth of information on the types of career programs these schools offer, it does not have other basic metrics, such as graduation rates and school size, on which families may base schooling decisions.

One solution to both of these problems—lack of proximity and information—are smaller vocational schools, known as career academies, that operate as a subset of a larger, more traditional public school. While the broader small schools movement has lost steam, these small-school career academies—which can be found in over 6,000 high schools today (Snyder and Dillow 2012)—have been gaining momentum. By having focused, career-oriented tracks and partnering with local businesses and community colleges, career academies aim to graduate students with career and technical skills and an established business network, in addition to the skills necessary to enter two- and four-year colleges. In their evaluation of nine representative urban high schools, Kemple and Snipes (2000) find that career

academy attendance significantly lowers dropout rates among high-risk students. Similarly, tracking students from one district, Maxwell and Rubin (2002) find that career academy students have higher graduation rates and a higher likelihood of starting a postsecondary education than students in traditional settings. And, studying JROTC (Junior Reserve Officer Training Corps) career academies across five major urban school districts, Elliot, Hanser, and Gilroy (2002) found improved graduation and attendance rates.

What is more, graduates of career academies see positive labor market outcomes, particularly among men. Over an eight-year period post-graduation, Kemple (2008) found in a randomized controlled study that male graduates of career academies saw a 17 percent increase in monthly income, earning a total of around $30,000 more than their non-career-academy peers. Career academies also seem to have had at least some success in funneling graduates into higher-income sectors; 7 percent of career academy graduates worked in tech fields compared to 4 percent in the control, for instance. Other school-to-work programs that integrate work-based learning have been found to increase the probability of employment after graduation, as Neumark and Rothstein (2006) show in an analysis of 1997 National Longitudinal Survey of Youth data in the aftermath of a temporary federal program that provided additional funding for such programs.

Given these results, expanding these programs to reach more at-risk students, particularly men, seems like a priority, and in fact, the Department of Education recently proposed funding for 3,000 additional career academies (US Department of Education 2012). As initiatives like these push vocational models, it is important that the right types of students are targeted. In 2000, for example, only 23 percent of high schools with more than 50 percent of students eligible for free or reduced price lunch had designated career academies. This is especially low given that among schools having less than 5 percent of students eligible for subsidized lunch, only 21 percent offered career academies (Silverberg, Warner, Fong, and Goodwin 2004).

Over the past decade, the primary federal policy aimed at vocational education—the Carl D. Perkins Vocational and Technical Education Act—has increasingly supported the further integration of academic and college-preparatory work with vocational education (Silverberg, Warner, Fong, and Goodwin 2004; Dann-Messier 2012). In other words, federal policies seem likely to encourage vocational programs to become less vocational. While the success of programs such as career academies may in part be due to the academic work required of students, one worry is that an increased focus on college prep activities will dilute the effectiveness of vocational tracks. Two models that have emerged from this increased college readiness focus have been largely successful, however. Tech-Prep programs place a strong emphasis on technology-related courses and partner with community colleges to help students earn college credits while in high school and guide them to two-year associate degree and certificate programs. The Department of Education estimates that nearly 50 percent of high schools and almost all community and technical colleges offer Tech-Prep. It has been found to increase high school graduation

rates and enrollment at two-year colleges, although this may come at the expense of student enrollment in four-year degree programs (Cellini 2006). A much smaller program (in 2005, involving under 100 high schools nationwide), Talent Development, combines school-within-school career academies with a college-preparatory curriculum and offers a range of remedial opportunities. An interrupted time-series evaluation of early-adopting schools finds impacts on both test scores and graduation rates (Kemple, Herlihy, and Smith 2005).

Herculean Efforts

This focus on college preparatory work even with career and technical education programs has been heightened as the Obama administration pushes for "every American to commit to at least one year of higher education or postsecondary training" (Dann-Messier 2012). However, programs on the other extreme from vocational education that specialize in high-powered college preparation have not been as effective in meeting their goals. Exam schools, which admit students using entrance exams, have been linked possibly to improved short-term outcomes (Dobbie and Fryer 2011c; Abdulkadiroğlu, Angrist, and Pathak 2011), but not to improved long-term outcomes such as college attendance.

This is where the "Herculean model" of charter schools comes in to bridge the gap. Over the past 10 years, enrollment in secondary charter schools has grown four-fold, even though most empirical research has not found a positive impact of charter schools on student achievement. In a recent meta-analysis of 25 studies using experimental approaches, Betts and Tang (2011) find that there are no significant effects of charter high schools on average, although effects do tend to be larger in urban schools.

However, a few wildly successful charters—those Herculean schools that follow what is known as the "No Excuses" model—have emerged. This model puts a strong emphasis on a school culture that promotes academic rigor and high behavioral standards, uses data to select and retain high-quality teachers, and has a longer school day and year.[2] Looking across charter school models in New York City, Dobbie and Fryer (2011b) document that those that follow a No Excuses Model (or use similar practices) have the largest impact.[3] Angrist, Pathak, and Walters (2011) reach a similar conclusion in an examination of the effects of a large sample of charter schools in Massachusetts. Using randomized admissions lotteries, Abdulkadiroğlu, Angrist, Dynarski, Kane, and Pathak (2011) find that average effects of attendance in these types of schools in Boston are large enough to close the math and reading achievement gaps between black and white high school students.

[2] For further discussion of the No Excuses model, see for example Carter (2000), Thernstrom and Thernstrom (2004), and Whitman (2008).

[3] They also find that standard input measures of class size, per pupil expenditure, and teacher qualifications are not correlated with school effectiveness. Similarly, Hoxby and Murarka (2009) find that the effectiveness of New York City charter schools is not associated with inputs like class size, but is strongly correlated with having a longer school year.

Dobbie and Fryer (2011a) find similar-sized effects in math (and smaller effects in reading) from attending Harlem Children's Zone (HCZ) No Excuses charter middle school. These students also have fewer absences, despite the fact that the lowest achieving students are required to be in school for roughly twice as many hours as the average New York City Public School student. The Knowledge is Power Program (KIPP) schooling model yields similar results, and low-ability students appear to have the largest gains (Angrist, Dynarski, Kane, Pathak, and Walters 2010; Betts and Tang 2011; Angrist, Dynarski, Kane, Pathak, and Walters 2012).

An open question is whether these small-scale educational successes can be scaled up and replicated. After all, these models do require an almost Herculean effort at all levels of the school—from administrators who foster a uniform school culture, to teachers who work longer hours, to students and parents who must be scholastically dedicated. There is some evidence that KIPP schools have been able to replicate their success. Gleason, Tuttle, Gill, Nichols-Barrer, and The (2012) use propensity score matching to measure the impact of admission to 22 KIPP schools across the country and find average test score effects equivalent to a year's worth of growth in math and three-quarters of a year in reading.

Fryer (2011a) examines an alternative to charter school expansion, testing whether key elements of the No Excuses models can be incorporated into traditional public schools. Nine underperforming middle and high schools in Houston first replaced all principals and half of the teaching staff, and then applied four tenets similar to those used in programs like KIPP and HCZ. These included increased instructional time, tutoring, data-driven instructional practices, and the fostering of a culture of high academic and behavioral expectations. Initial results after the first year saw achievement gains on par with those in No Excuses charter schools. This study provides the first set of results to indicate that the lessons learned from these charter school programs may generalize. This bodes well for reforms such as the federal government's recent Race to the Top program, which is designed to reduce the achievement gap by rewarding innovation and promoting educational tenets similar to those implemented in Houston.[4]

While these results are encouraging, they do not address key policy questions about implementing the No Excuses model on a large scale. KIPP, for example, is the nation's largest charter management organization, but serves only about 2 percent of charter school students and less than 0.1 percent of all public school students (Gleason et al. 2012).

The barriers to scale-up on the supply side are related to personnel and funding. As we discussed above, high-quality principals and teachers are a key input into successful schools. This is particularly true in the No Excuses model. Fryer (2011a) documents that over 200 principals had to be interviewed to find nine who

[4] As a caution, models that share these features but do not embed them in the regular school day do not seem to be as effective. Though there were positive impacts at some specific sites, the Quantum Opportunity Program, an after-school program that targeted at-risk youth had no long-term impacts (Maxfield, Schirm, and Rodriguez-Planas 2003).

demonstrated a commitment to the No Excuses model and a record of achievement. No Excuses schools also require teachers who will buy into a nontraditional educational agenda, accept less job security, and meet the heavy demands—including longer hours and greater emphasis on student performance—that these schools place on faculty. This is likely a primary reason why teachers in No Excuses schools tend to be much younger than in traditional public schools; in Boston, 6 percent of charter teachers are 49 or older compared to 40 percent district-wide (Abdulkadiroğlu, Angrist, Dynarski, Kane, and Pathak 2011). This also implies that these schools must recruit from what is likely a limited pool: young teachers who are dedicated and talented despite their inexperience.

Funding also limits the ability of such schools to spread. Direct comparisons of costs in charter schools and traditional public schools are often difficult due to differences in funding structures. However, Dobbie and Fryer (2011a) estimate that HCZ spends $19,272 per pupil compared to $16,171 per pupil in the median school district in New York State. The authors argue that if the test score effects they measure translate into longer-term educational gains, HCZ easily passes a cost–benefit analysis. However, such arguments do not always produce adequate financial resources.

The No Excuses model also faces important barriers on the demand side. Like vocational schools, No Excuses schools seem to be undersubscribed given their effects on achievement. This is in part due to the same factors we discussed above—lack of information and defaulting into a neighborhood school. In Boston, for example, district-provided resources on schooling options do not typically include information about charter schools, and distance from a charter school is a strong predictor of attendance (Walters 2012).[5]

However, expanding information and access may have a limited impact—in part because many students may not be well matched with the No Excuses model. To make this concrete, imagine a public policy that makes a spot in a No Excuses school available to all current applicants. We know from the existing data that many of those who are admitted will not enroll—about 30 to 40 percent in HCZ (Dobbie and Fryer 2011a)—or will enroll and then leave. The relevant measure for this policy then is the impact of receiving admission to a No Excuses school regardless of actual attendance. In Boston charters, the effects of receiving admission are significant, but are about one-quarter the size of those for actual attendance that we discussed above (Abdulkadiroğlu, Angrist, Dynarski, Kane, and Pathak 2011; for comparability, we use the authors' estimated effects per potential year spent in a charter school). While there are many reasons why students might gain admission and not enroll, or enroll and then leave, the gap between these effects gives some

[5] There is evidence that charter applicants do learn about school quality and are responsive to this information. Schools that are oversubscribed tend to have larger effects than schools that are undersubscribed (Abdulkadiroğlu, Angrist, Dynarski, Kane, and Pathak 2011; Angrist, Pathak, and Walters 2011). Similarly, Hanushek, Kain, Rivken, and Branch (2007) argue that exit rates from charter schools are negatively associated with value added measures of school quality.

indication of the importance of exit rates, which may be due in part to students' mismatch with the demands and culture of No Excuses schools.[6]

Another policy we can imagine is one that expands access to those students who could benefit from the programs, but who do not currently apply. Walters (2012) simulates the effect of this policy in Boston, which as of 2011 planned to expand its number of charter schools by about 80 percent. He finds that those low-income, low-ability students who stand to gain the most from No Excuses schools are the least likely to opt-in. These students' high perceived costs of applying and strong preferences for traditional public schools dampen the effects of expansion.

This leads to the experiment, like that taking place in Houston, of integrating elements of successful charters into traditional public schools. This approach may increase the number of students experiencing the No Excuses model, although students for whom the model is a bad match may transfer schools or drop out. One early finding from the Houston experiment is instructive. Fryer (2011a) finds that the program leads to lower college attendance but that conditional on college attendance, students are more likely to enroll in a four-year institution. One interpretation of this result is that the program's explicit goal of 100 percent attendance at a four-year college or university pushes everyone down the same path when a two-year college or vocational training might be a better match for many students. However, it is not clear what the overall impact of these interventions will be, since more generally, we lack evidence on the long-term impact of No Excuses schools that would allow us to compare measures of educational attainment and labor market outcomes from these Herculean efforts to the impacts of vocational schools discussed above.[7]

Targeted Interventions

Why might the two approaches work? In part, their success may stem from addressing gaps in noncognitive skills and structuring learning to motivate and engage students. A growing literature links noncognitive ability—a broad set of skills captured by measures of behavior, personality, and work ethic—to educational achievement as well as longer-term outcomes including employment, wages, health, and crime (for example, Heckman, Stixrud, and Urzua 2006). A smaller set of studies documents racial and gender gaps in these skills. Black and Hispanic children demonstrate more antisocial behavior and receive lower ratings on measures of self-control and interpersonal skills (Carneiro, Heckman, and Masterov 2005; Goldammer 2012). Jacob (2002) finds that high school boys have lower noncognitive

[6] In response to evidence that some charters experience high exit rates, Abdulkadiroğlu, Angrist, Dynarski, Kane, and Pathak (2011) and Angrist, Dynarski, Kane, Pathak, and Walters (2012) argue that exit rates among charter school students are similar to those for their peers in traditional public schools.

[7] Abdulkadiroğlu, Angrist, Dynarski, Kane, and Pathak (2011) find that Boston No Excuses charter schools do not have a significant impact on high school graduation. More generally, there is a dearth of evidence on the longer-term impacts of charter schools of any type. In a lottery-based study, Strick (2009) finds that students in a single San Diego charter school are more likely to attend college. In an observational study, Booker, Sass, Gill, and Zimmer (2011) find that charter school students in Chicago and Florida high schools have higher graduation and college attendance rates.

ability than girls on measures of behavior and work ethic, and argues that this can partially explain the gender gap in college attendance. These findings point to potential mechanisms for several of the results discussed above—for example why career academies offering an alternative to college may be especially beneficial for boys, and why the No Excuses model's focus on behavior particularly benefits low-achieving and minority students.

Understanding the role of noncognitive skills in these larger interventions could help guide smaller-scale policies. There is limited but intriguing recent evidence on attempts to manipulate student noncognitive skills and effort that suggests, if targeted well, such efforts could be quite cheap. Hill, Roberts, Grogger, Guryan, and Sixkiller (2011) discuss several interventions that reduce delinquency by intervening on noncognitive rather than cognitive skills. In this spirit, the initial results from an intervention among disadvantaged high school boys in Chicago, which focused on developing skills related to emotional regulation and social-information processing, suggest large increases in schooling outcomes and large decreases in violent crime arrests (University of Chicago Crime Lab 2012). Equally striking is that short-term financial incentives, which address students' lack of ability to plan for the future, appear to lead to increased effort and improved test scores (Braun, Kirsch, and Yamamoto 2011; Levitt, List, Neckermann, and Sadoff 2012). Such targeted interventions can stand alone within a traditional school or can potentially complement the alternative models discussed in this section.

Implications

In spite of decades of well-intentioned efforts targeted at struggling high schools, outcomes today are little improved. A handful of innovative programs have achieved great success on a small scale, but more generally, the economic futures of the students at the bottom of the human capital distribution remain dismal. In our view, expanding access to educational options that focus on life skills and work experience, as opposed to a focus on traditional definitions of academic success, represents the most cost-effective, broadly implementable source of improvements for this group.

Increased school choice has been a centerpiece of educational policy reform over the last decade. In its current incarnation, it primarily provides underserved students access to higher-quality, traditional, college preparatory schools. School districts that allow some schools to deviate from this model in the form of career magnet schools and academies have seen the greatest impact on student achievement through improved match quality. Expanding vocational options should be a primary objective of school choice, not merely an afterthought. A possible area for innovation would be to focus curricula around those job market sectors—such as technology and business—that yield the highest returns to a high school diploma.

The other nontraditional schooling options that most help struggling students are Herculean models such as No Excuses. Unfortunately, perhaps the scarcest

resource in education today is innovators like Geoffrey Canada, who started the Harlem Children's Zone, or Mike Feinberg and Dave Levin, who founded KIPP. Indeed, these innovations have occurred mostly at a small scale, and it is unclear whether schools that adopt these models without the guidance of the founders will prove as successful. One of the greatest gaps in our current understanding is the process by which small-scale interventions can be actualized on a grand scale. That area deserves to be the focus of intense research effort.

Ultimately, we believe that a program of education reform will work best when students and families are provided with a variety of schooling models from which to choose, and when information about these choices is disseminated effectively. Future reform efforts should aim to expand the variety of educational models available to underachieving high school students and reward broader measures of success than those embedded currently in school accountability systems. School districts could help foster innovations by using school choice legislation as a way to allow for sorting and better match quality among secondary school students and their schools. In this type of educational environment, empirical researchers have the opportunity to provide guidance to policymakers and innovators. More research is needed to sort successful school models and components from those that do little to improve graduation rates and subsequent labor market outcomes.

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