

# From High School to the Future: Delivering on the Dream of College Graduation

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“A good life and I also want a good life for my parents, ‘cause they work for me and they work hard. They both work in factories, been working there like 20 years, so I want to get a good job so they don’t have to work anymore...If I don’t get good grades, can’t get into a good college. If I don’t get into college then I can’t get a career; no career, no good paying job, no white picket fence.”

- José (Potholes on The Road to College)<sup>1</sup>

## Introduction

“College and career readiness” has become the mantra of high school reform across the country. The goal of virtually every new educational program, school district strategic plan, or foundation initiative centers on some variation of readiness for “success in college, career and life.”<sup>2</sup> Despite the overwhelming agreement on the importance of students graduating college and career ready, according to the National Center on Education Statistics, only 36 percent of adults aged 25-29 hold a bachelor’s degree.<sup>3</sup> Over the last decade, the University of Chicago Consortium on School Research (UChicago Consortium) series, *From High School to the Future*, has brought evidence to bear on questions about the Chicago Public Schools (CPS) graduates’ post-secondary outcomes. The initial report in the series highlighted two important points: 1) How low GPAs and ACT scores constrain CPS students’ access to college and seriously undermine their chances of being successful once enrolled in college; and 2) the important role that college choice plays in maximizing the pay-off for students’ hard work in high school.

As we will see in the first section of this report, there is much good news with respect to academic trends in CPS. Since our first report in this series, CPS has seen substantial improvements in students’ academic qualifications. In fact, CPS is on par with the nation in four-year college enrollment, a critical first step on the road to college completion.<sup>4</sup> Despite improvements, currently, only 18 percent of CPS ninth-graders earn a four-year college degree<sup>5</sup> within a decade of high school graduation. Given the demographic makeup of CPS, this number is not altogether surprising, and highly reflective of national trends in

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<sup>1</sup> Roderick et al. (2008).

<sup>2</sup> Chicago Public Schools (2014).

<sup>3</sup> National Center for Education Statistics (2016).

<sup>4</sup> Nagaoka & Healey (2016).

<sup>5</sup> This report focuses specifically on four-year college outcomes. Unless otherwise stated, college (in this report) refers to four-year college.

college completion. According to the National Center on Education Statistics, in 2016 only 14 percent of Latino adults and 19 percent of Black adults had earned a bachelor's degree, despite 45 percent of Latino adults and 49 percent of Black adults reporting at least some college enrollment: A glaring reminder that college enrollment is not synonymous with college completion.

The discrepancy between college ambitions and college completion is a reality faced by even the most qualified high school students. Research indicates that as of 2015, 76 percent of CPS ninth-graders aspire to earn a bachelor's degree,<sup>6</sup> and yet our current analysis indicates that even the most qualified CPS graduate—who leaves high school with a 4.0 cumulative GPA—has just a 50 percent chance of enrolling and graduating from a four-year college in four years. Using objective measures such as ACT does not yield better results. A CPS graduate with a 26 ACT (80th percentile nationally) has only a one-in-three chance of graduating from a four-year college in four years. How can students with such high academic qualifications face such abysmal college graduation prospects? The goal of this report is to take this question head on and reveal the points of leverage within Chicago's public high schools to substantially move districtwide college completion rates.

In this final report of the *From High School to the Future* series, we move beyond college access and examine many of the same questions we asked in our first report, but from the perspective of four-year college completion. In many ways, this report brings full circle the research of the Chicago Postsecondary Transition Project, and grounds our findings in a set of strategies to raise college degree attainment for CPS graduates. Our initial report tackled many the same questions that we address in this final report: Why—despite high aspirations—do so few CPS graduates graduate from college? Surprisingly, the answers remain largely the same: Academic qualifications and college choice. What has changed dramatically, however, is our understanding of how disparities in college graduation begin far before college enrollment, and the role that high schools and colleges play in shaping the academic outcomes of their students.

Even among educators who embrace a focus on college-going, there have been real tensions between research findings and the realities of their work. Throughout this series of reports, we have consistently observed three areas where district policies and the day-to-day work of urban educators disconnect, often creating confusion about what findings mean or how to use them in practice.

First, to many principals, counselors, and teachers, much of the rhetoric about college readiness leaves out many of their students and does not reflect the real challenges they face as educators in reaching district goals. In 2017, CPS moved away from administering the ACT to administering the SAT. Despite this change, the use of these test scores as an indicator of college readiness remains the same. CPS currently has a college readiness benchmark set of an SAT score of 1010, a score that eludes more than half of CPS juniors. And yet, very little discussion has been focused on what college prospects and outcomes look like for the majority of students who do not meet this district benchmark.

Second, there is a substantial disconnect between a reliance on standardized test scores as indicators of college readiness, and the research evidence that a student's GPA is a better predictor of college graduation than test scores.<sup>7</sup> At best, this finding seems implausible to many high school educators because of the deeply-held belief that grades are not a reliable measure of performance. At worst, the relative importance of GPA over and above test scores suggests these educators' day-to-day efforts to raise test scores are misguided, leading to greater confusion rather than clarity about what college readiness really means.

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<sup>6</sup> Nagaoka & Healey (2016).

<sup>7</sup> This report only examines unweighted GPA. Therefore, all references to GPA refer to unweighted GPA unless otherwise stated.

Third, while there is an increasing amount of evidence that college choice matters significantly in whether students with similar qualifications will do well in college, it is unclear how high schools should respond to this information. Our research has consistently underscored that—particularly for low-income, minority, and first-generation college students who lack social capital for college-going—effective supports from high school staff members are a critical link in connecting them to good college options. While this information can empower counselors and teachers to take on a different role in students’ lives, not all educators are comfortable with this task. It has not traditionally been the role of high school educators to influence the college choices of students, and most educators are not trained to do this work. Where to attend college is an important choice, both for a student personally and for the student’s family, and many believe it is outside of the purview of schools to influence this decision. Between the research evidence on the importance of college choice and the hesitation to overstep authority, it is a struggle for high schools to determine what the appropriate role of educators should be in influencing students’ college decisions, let alone how to do it. The goal of this report is to address these tensions directly while evaluating whether different strategies are equally beneficial to all students.

## Summary of Findings

This report outlines the results from a series of statistical simulations meant to evaluate the potential effects of strategies aimed at increasing higher education outcomes for CPS students. Our research has intentionally focused on empowering educators and students with tangible, sustainable, and scalable solutions they can employ in their own schools. This report provides insight into which strategy has the largest potential to improve college outcomes, and lays the foundation for future studies. As such, we focus our analyses on potential intervention points available to high school educators and administrators: working to increase cumulative GPA, working to increase ACT scores, and improving college choice strategies for CPS graduates. While our simulations are intended to empower high school educators by providing information on which strategies have the highest potential for improving student outcomes, our findings strongly implicate the shared role of high schools and higher education institutions in shaping college graduation outcomes for CPS graduates.

Findings of this report reinforce previous research while providing a deeper understanding of college graduation outcomes for CPS graduates:

### ***1) Graduating from high school is not enough to prepare students for college***

Students without strong academics in high school have little chance of earning a college degree. This analysis finds only a small portion of CPS college-goers—those with an average combination of above a 3.3 unweighted GPA and an ACT score of 26 and above—have four-year graduation prospects that exceed 50 percent. For college-goers with slightly lower qualifications—an average, unweighted GPA of 3.1 and an ACT score of 21 or higher—four-year graduation prospects drop to 30 percent. Average four-year graduation rates are less than 10 percent for many CPS college-goers: those who leave high school with below a 2.5 unweighted GPA and below an ACT score of 18.

### ***2) Increasing GPA is key to increasing college outcomes***

For students of all academic qualifications, increases in high school GPA have greater effects for college completion than would comparable increases in these same students’ ACT scores. Increasing GPA by 0.4 points makes up almost one-half of the difference between the CPS and national four-year college graduation rates, and has a larger impact on college graduation than increasing ACT scores for all students.

### ***3) College choice can significantly influence students' college outcomes***

Similarly-qualified students who graduate from different high schools can have stark differences in college graduation rates. Almost one-half of this between-school difference can be attributed to the colleges to which high schools send their students. This finding challenges the inclination to attribute differences in college outcomes primarily to variation in academic rigor and grading between high schools.

When we look at the impact of college choice on students' graduation rates, particularly the impact of students' enrolling in a match college—one that matches or exceeds their academic qualifications—we find that:

- **College choice has little impact on graduation for students with low qualifications.** More than 70 percent of CPS graduates in our sample have academic qualifications so low that their probability of earning a four-year degree is less than 10 percent. Even when these students are able to make a “better” college choice, they are still left with very little chance of graduating.
- **For students with qualifications that grant them access to somewhat selective colleges, avoiding underperforming colleges is strikingly important.** The range of graduation rates at local, somewhat selective colleges is incredibly large, from 2 percent at one local college to almost 50 percent at another local college. Current college selection patterns indicate that students with access to somewhat selective colleges are likely to choose a college on the lower end of graduation rates. Improving college choice for these students could make a large difference.
- **For students with qualifications that grant them access to selective colleges, attending a “match” college yields the highest benefits.** These students' trajectories are dramatically changed by their attendance at a “match” college. Selective and very selective colleges tend to have higher graduation rates than their less selective counterparts, and high-achieving students can be hurt the most by undermatching; that is, when they attend colleges with admissions criteria below those to which their academic qualifications enable them able to attend.
- **Contrary to what many people believe, college choice becomes more important the higher a student's qualifications.** This contradicts the belief that good students are good students anywhere and will succeed anywhere. In reality, highly-qualified students are exposed to greater risk by attending colleges that continuously underperform.

These findings challenge both high schools and colleges. For high schools, the importance of making hard work pay off lies in helping students make college choices that translate their high school preparation into the highest chance of earning a college degree. For colleges, the challenge in making hard work pay off is to ensure the students they admit receive the resources and supports necessary to succeed.

## **Enduring Myths**

**Low-income, minority, and first-generation students face an array of challenges on their way to college completion, including misguided and unfounded assumptions about their ability to succeed. Unfortunately, many of these assumptions are perpetuated by the very people students rely on to shape their educational opportunities.**

### **Myth #1 - An A is not an A (at least not in lower-performing schools).**

One of the most pervasive myths in secondary education is the belief that an A at a struggling school inherently means something different than an A at a high-performing school. Often lurking behind this myth is the belief that lower-performing schools “give out As like candy,” or that it takes very little effort to get an A at an underperforming school. Recent research indicates that grades across CPS high schools are fairly consistent for students of similar test-scores.<sup>A</sup> Students with ACT scores of 25 and higher see less than a half-point difference in GPA between the lowest- and highest-performing schools in the district. Similarly, students with ACT scores between 18 and 24 see a GPA difference of about 0.7 grade points between the lowest- and highest-performing schools in the district. While a difference in GPA of 0.5 or 0.7 may matter significantly to an individual student, such differences do not equate to even a single letter grade, suggesting that grades are more consistent across schools than some believe.

### **Myth #2 - Good students will do well anywhere.**

The idea that good students will be successful wherever they go to college is deeply intuitive, and appeals to our inclination to center student success solely around the student. However, previous research indicates that institutions do play a role in college completion. Specifically, students who attend more selective colleges and universities fare better with respect to college graduation than their peers who attend less selective schools. Assuming that highly-qualified students will be successful at any college ignores the reality that students do not learn or succeed in a vacuum, and places the onus on students to overcome the institutional barriers of underperforming schools.

### **Myth #3 - Sending CPS students from low-performing high schools to elite colleges is just setting them up to fail.**

There is a belief amongst some educators that students from struggling high schools are not equipped to succeed at elite institutions. While it is true that low-income and minority students do experience many challenges at elite institutions, research indicates that these students are no worse off by attending more selective institutions.<sup>B</sup> Highly-achieving low-income, minority, and first-generation students have proven their ability to be successful in the face of adversity. We should be ensuring that these students have access to our greatest opportunities, not withholding them.

### **Myth #4 - Highly-qualified students of color have elite colleges beating down their door.**

While it is true that many elite colleges and universities have dedicated resources to recruit underrepresented students, research suggests the vast majority of highly-qualified students in underperforming high schools remain disconnected from these opportunities.<sup>C</sup> Elite colleges and universities do not routinely visit largely underperforming, low-income, and minority-serving high schools.<sup>D</sup> Thus, without direct intervention from educators or other college-fluent adults, highly-qualified students from underperforming high schools remain disconnected from the admissions process to more elite institutions.

<sup>A</sup> Allensworth & Clark (2018).

<sup>B</sup> Kurlaender & Grodsky (2013); Small & Winship (2007).

<sup>C</sup> Roderick, Nagaoka, Allensworth, Coca, Correa, & Stoker (2006); Hoxby & Turner (2012); Hoxby & Avery (2013).

<sup>D</sup> Hoxby & Avery (2013).

Section I explores the recent state of college qualifications in CPS and compares how academic strategies, such as increasing GPA or ACT scores, can impact students' prospects of completing college. Section II examines the recent state of college choice in CPS and compares how simple college choice strategies in high school can affect students' prospects of completing college. In Section III, we estimate how college choice strategies could impact college completion rates across the district, and how schools can utilize these strategies to improve their college completion rates.

### **The Role of Simulations**

While we can never thoroughly address the wide range of issues that affect students' ability to succeed in college, we can tackle some fundamental questions regarding college readiness and enrollment that shape tens of thousands of students' college prospects every year. And while the college options of the highest-qualified students and least-qualified students are vastly different—and this limits our ability to make a causal claim—the longevity of the Chicago Postsecondary Transition project allows us to ground our discussion of college readiness in an analysis of what matters for college graduation using the actual performance of students in the colleges they attend.

There are many different ways to examine the effects of academic and college choice factors on students' probabilities of graduating from college. In this report, we present a series of simulations that explore how to improve college graduation rates for CPS students, working up from the reality of student performance, rather than down from a set of seemingly unattainable college readiness benchmarks. To do so, we conduct a series of simulations, examining changes in expected outcomes under four different conditions. Each simulation was conducted as a four-stage process:

1. We estimated models of students' probability of graduating from four-year colleges.
2. We calculated predicted probabilities of college graduation for each student based on those models.
3. We changed academic qualification values or institutional fixed effect values to reflect simulation conditions.
4. We recalculated predicted probabilities and examine change in expected graduation rate for all students and academic subgroups.

The approach we employed was recommended by Associate Professor Bennet Zelner<sup>E</sup> of The University of Maryland's Smith School of Business, as a way of presenting complicated information for more simple interpretation. It also allows for easier comparisons between existing conditions and those predicted by a simulation, as well as comparisons between the predicted effects of the four simulations. This is of particular importance in this study, since we are drawing comparisons between simulated conditions that are difficult to make comparable (i.e., what is the change in college choice that is comparable to a standard deviation of GPA or ACT score?). Similar methods have been used to examine the potential effects on college outcomes of changing Affirmative Action policies,<sup>F</sup> college costs and family environments,<sup>G</sup> and financial aid packages.<sup>H</sup> In addition, simulations are an emerging methodology in the study of the effect of college choice; previous studies have used the method to consider the effect of attending a "match" college.<sup>I</sup>

The use of simulations has a number of distinct advantages. First, simulations allow us to estimate the marginal effect of small changes in factors that affect students' probability of graduating from college. Because we know a good deal about what predicts a student's likelihood of success in college, simulations allow us to manipulate one factor while keeping others constant, so that we can show separately the impact of improving grades, ACT scores, and college choices. Second, the use of

simulations allows us to measure how changes in those factors affect different groups of students differently. Third, the use of simulations shows the effects of these changes in real terms (e.g., system-wide averages) rather than statistical units.

By simulating the effect of four distinct strategies—increasing GPA, raising ACT scores, improving college match, and avoiding underperforming colleges—on college graduation, this report shifts the discussion of college readiness away from the reliance on benchmarks and toward a clear, focused comparison of the effectiveness of concrete strategies to increase postsecondary attainment for the district.

<sup>E</sup> Zelner (2009).

<sup>F</sup> Espenshade & Chung (2005); Arcidiacono (2005).

<sup>G</sup> Cameron & Heckman (2001).

<sup>H</sup> Desjardins & McCall (2010).

<sup>I</sup> Bastedo & Jaquette (2011); Akers & Chingos (2014); Howell & Pender (2016).

## **Sample**

The study sample, unless indicated otherwise, is comprised of students who graduated from CPS high schools between 2003 and 2009, excluding students attending alternative or charter high schools. Students from charter and alternative high schools were omitted due to incomplete or incomparable grade data. Students in self-contained special education schools were also omitted due to differences in the learning environment. This sample includes 112,096 students at 109 high schools. Of these graduates, 56.5 percent are female and 43.5 percent are male. Also, 47.4 percent are Black, 34.8 percent are Latino, 5.6 percent are Asian or Pacific Islander, 12.0 percent are White, and 2 percent are other.

In the analyses of four-year college completion rates, the subsample is restricted to students who matriculated at a four-year college by the fall immediately following their high school graduation. This subsample includes 36,609 students who attended 799 different colleges and universities. Of these graduates, 61.7 percent are female and 38.3 percent are male. Also, 49.0 percent are Black, 24.4 percent are Latino, 10.2 percent are Asian or Pacific Islander, 16.4 percent are White.

## **Four-Year vs. Six-Year Graduation Rates**

This report uses the completion of a bachelor's degree within four years of graduating from high school as its key outcome.

This choice may be controversial to some; research on higher education often studies graduation in six years rather than four. The choice to consider only four-year graduation means that the graduation rate is lower for virtually all colleges and universities in our sample, as well as for CPS as a whole. However, we have made the decision to consider only four-year graduation in this report for an important reason. The vast majority of CPS graduates who attend college are from low-income families. Most financial aid on which students so often depend to afford college is based on an assumption that it takes four years to complete college; examples include Federal Pell Grants, state and institutional aid, and even subsidized Federal loans.

# Section I: Academic Qualifications as a Point of Leverage

## ACT

Prior to 2017, CPS used a composite ACT score of 20 or higher as an indicator for students' readiness for college. This score was based on college readiness benchmarks established by ACT.<sup>J</sup> In 2017 CPS moved from administering the ACT to administering the SAT to all juniors. Based on The College Board's<sup>K</sup> determination of college readiness to be an SAT score of 1010, CPS has set a goal for 50 percent of juniors to meet or exceed this benchmark by 2019.<sup>L</sup> While the ACT is no longer the test of choice for CPS, the use of standardized test scores as a measure of college readiness continues to be policy for CPS and other districts across the country. As such, the results of this report serve to inform the ongoing debate about the relative importance of test scores when seeking to improve students' college completion rates.

<sup>J</sup> Allen & Radunzel (2017).

<sup>K</sup> The College Board (2018).

<sup>L</sup> Chicago Public Schools (2016).

## GPA and ACT as Measures of College Readiness

One of the major findings of the first report in this series<sup>8</sup> was the strong relationship between high school GPA and college access: High school students who graduated with a GPA of 3.0 were four times more likely to enroll in college than students who graduated with a 2.0 GPA. Furthermore, as high school qualifications increased, so did the importance of GPA. For students on the lower end of the GPA and ACT range, improvements in GPA and ACT garnered similar increases in college access. For these students, academic qualifications served as major barriers to college, and gains in either GPA or ACT paid off equally well. However, as students' qualifications increased, increases in GPA had a greater impact on college access than comparable improvements in ACT. A shift in attention away from standardized test scores and toward GPA has emerged in CPS. Despite this shift in focus, standardized test scores are still used as a measure of college readiness in CPS, and much of the attention on improving students' college readiness at the national level remains focused on raising standardized test scores, not GPA.

While previous research clearly outlines the importance of increasing GPA, the decision to continue efforts in improving ACT scores is not without logic. First, a substantial portion of students in CPS have very low academic qualifications, leaving much room for improvement in either GPA or ACT. Second, raising standardized test scores is something that can be undertaken at any point in a student's high school career. Alternatively, the cumulative nature of GPA means improving students' GPAs requires early and persistent investments throughout high school. Given these differences, it is no wonder that improving test scores has been at the forefront of most high school education initiatives.

As high schools have stepped up efforts to boost test scores, colleges have been shifting focus away from test scores and onto GPA in the college admissions process. Differences in how high schools and colleges conceptualize college readiness are the root of much of the disparity between students' college ambitions and college success. From a college's perspective, college readiness means possessing the necessary

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<sup>8</sup> Roderick et al. (2006).



content knowledge, core academic skills, and noncognitive skills to successfully navigate college classrooms and master college-level curriculum. Colleges use GPAs and test scores as crude measures of these skills, with a particular focus on the cumulative, long-term nature of GPA. This perception is strikingly different for high schools. From a high school's perspective, college readiness means adequately preparing students for college admissions. On its face, these two goals may seem the same; however, high schools are more focused on admissions, whereas colleges are focused on completion. From a high school's perspective, earning a high school diploma and enrolling in college is the essence of a high school success story: educators have passed the baton on to the coveted and capable hands of higher education. After all, colleges set their own criteria for admissions and select students based on those criteria. It is not unreasonable, then, for high school educators to believe that students who are admitted to college will succeed in college, especially given the lack of data available to high schools on their students' college outcomes.

While high schools and colleges may be using students' academic qualifications differently, they are nonetheless both focused on the same academic measures: GPA and test scores. In this section, we will revisit the relative importance of GPA and ACT, armed with students' college outcomes.

## The Academic Preparation of Chicago Public Schools Graduates

Examining the college graduation outcomes of high school students means accepting considerable lag time between the academic inputs under question—like high school GPA or ACT—and the outcome of concern, college completion. Such a lag time means the academic qualifications of the students in our sample are not necessarily reflective of the current state of academic preparation of CPS graduates. Since this study was conducted, much districtwide improvement has been seen on many measures including GPA, ACT scores, and college enrollment. Even still, we must look backwards to better understand the progress that has been made, as well as what lies ahead. With this in mind, we present an overview of the longitudinal trends of CPS graduates' academic qualifications, looking at the graduating cohorts of 2003-09—which make up the analytic sample of this study. These data paint a concerning picture of the college graduation prospects for CPS graduates with lower academic qualifications. Most of the students in our sample left high school with low academic qualifications (an average GPA of 2.2 and an average ACT score of 17.4), relative to the standards expected for students enrolling in college. These averages were lower than national averages, and placed students at a distinct disadvantage with regards to college admissions. Even restricting our analysis to include only college-goers reveals qualifications were still quite low, with an average GPA of 2.78 and an average ACT of 20. Therefore, even though many graduates gained access to four-year colleges between 2003-09, their level of academic preparation made their chances of reaching college graduation unlikely.

**Table 1. Only High School Graduates with Access to Very Selective Colleges (Based on their GPAs and ACT Scores) Graduate College at more than a 50 Percent Rate. This Group Comprises less than 10 Percent of All Chicago Public School Graduates Between 2003 and 2009**

| Qualifications of Graduates that Allow Access to Colleges: | All<br>n=112,096 | Very Selective<br>n= 9,772 | Selective<br>n= 14,162 | Somewhat Selective<br>n= 30,573 | Non selective<br>n= 21,831 | Two-Year<br>n= 35,758 |
|--|------------------|----------------------------|------------------------|---------------------------------|----------------------------|-----------------------|
| Enroll in Four-Year College                                | 32.7%            | 81.2                       | 60.3                   | 41.1                            | 21.6                       | 7.9                   |
| Earn Bachelor’s Degree in Four Years (of College-Goers)    | 26.2%            | 59.2                       | 30.1                   | 14.4                            | 7.4                        | 6.2                   |
| Earn Bachelor’s Degree in Four Years (All CPS Graduates)   | 8.6%             | 48.1%                      | 18.2%                  | 5.9%                            | 1.6%                       | .5%                   |

Note: This table includes students for graduating CPS classes of 2003-09, excluding students from alternative high schools, charter high schools, and some special education programs. Probability of college graduation refers to the probability of earning a bachelor’s degree within four years of high school graduation. The college selectivity category to which a student has access is determined based on their high school GPA and ACT score.

Between 2003 and 2009, CPS graduated more than 112,096 students—more than 57,000 of whom graduated high school with qualifications so low that they only had access to nonselective or two-year colleges. Four years after graduation—the time it theoretically should take a high school graduate to earn a bachelor’s degree—only 528 of the 57,000 students with low qualifications had earned a four-year degree. The story remained largely the same for the more than 30,000 students who graduated with qualifications that granted them access to somewhat selective colleges; only 6 percent of these students earned a bachelor’s degree in the four years post high school graduation. Given that college access is directly tied to academic performance, it seems prudent to focus on improving students’ academic qualifications as a method to boost college graduation rates.

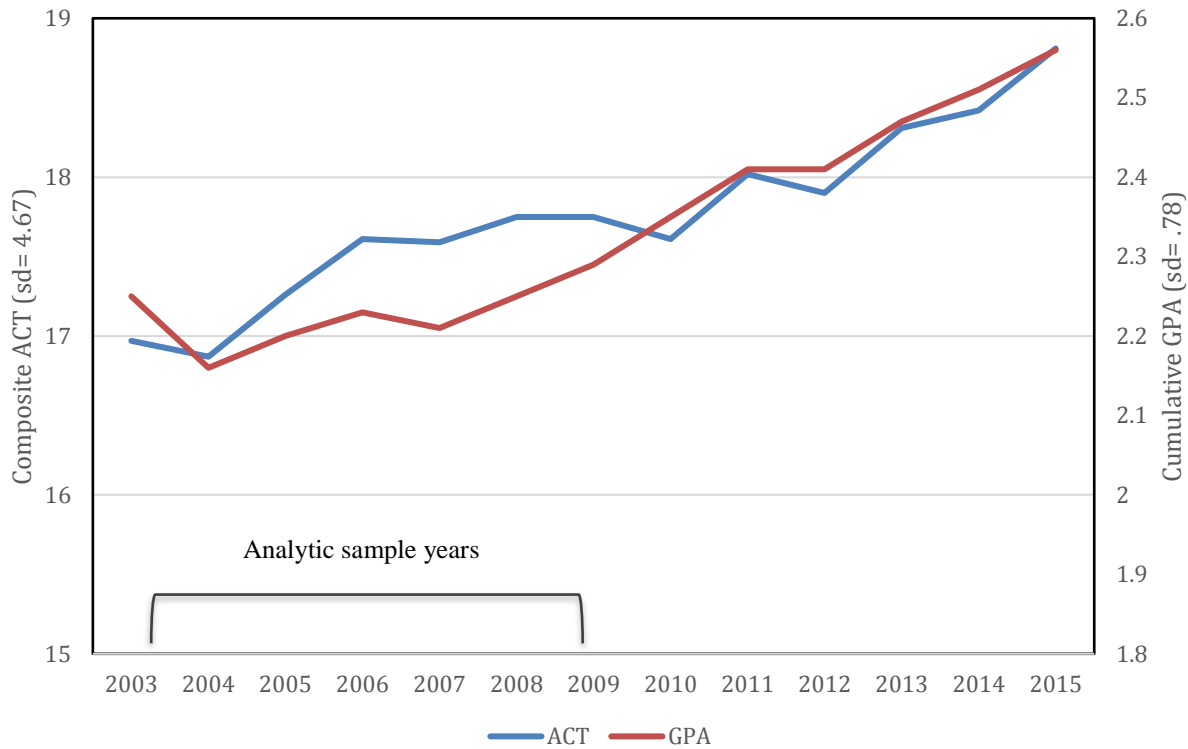
Low qualifications hurt students’ chances of earning a college degree in at least two ways: First, low qualifications are a barrier to entry to colleges in general, and, specifically to colleges with higher graduation rates and greater financial resources (and thus lower costs to students from low-income families). Second, once students enter college, lower high school qualifications are a likely indicator that a student lacks the necessary preparation to complete college-level work. Prior research, both from the UChicago Consortium and other researchers, has consistently demonstrated a strong connection between students’ academic qualifications and their likelihood of graduating from college.<sup>9</sup>

If lower qualifications translate into fewer students graduating from college, it is intuitive that improving those qualifications could be an effective strategy in helping more students succeed in college. Indeed, this is the focus of much of the national discussion of college readiness; if students had higher academic qualifications, they would be more ready to enter and graduate from college. Increasing student qualifications has also been at the forefront of district efforts.

<sup>9</sup> Roderick et al. (2006); Geiser & Santelices (2007); Bowen, McPherson, & Chingos (2009); Black, Cortes, & Lincove (2016).

Figure 1 depicts the improvements in mean GPA and ACT score for CPS graduates between the years of 2003 and 2015. As illustrated by the consistent upward trend in both the blue line (ACT score) and the red line (cumulative GPA), improvements have been steady. As illustrated in Figure 1, the districtwide average ACT score has increased from 16.97 in 2003 to 18.81 in 2015, about a .4 standard deviation increase. Cumulative GPA has increased from 2.16 to 2.56 during the same period, about a 0.5 standard deviation increase.

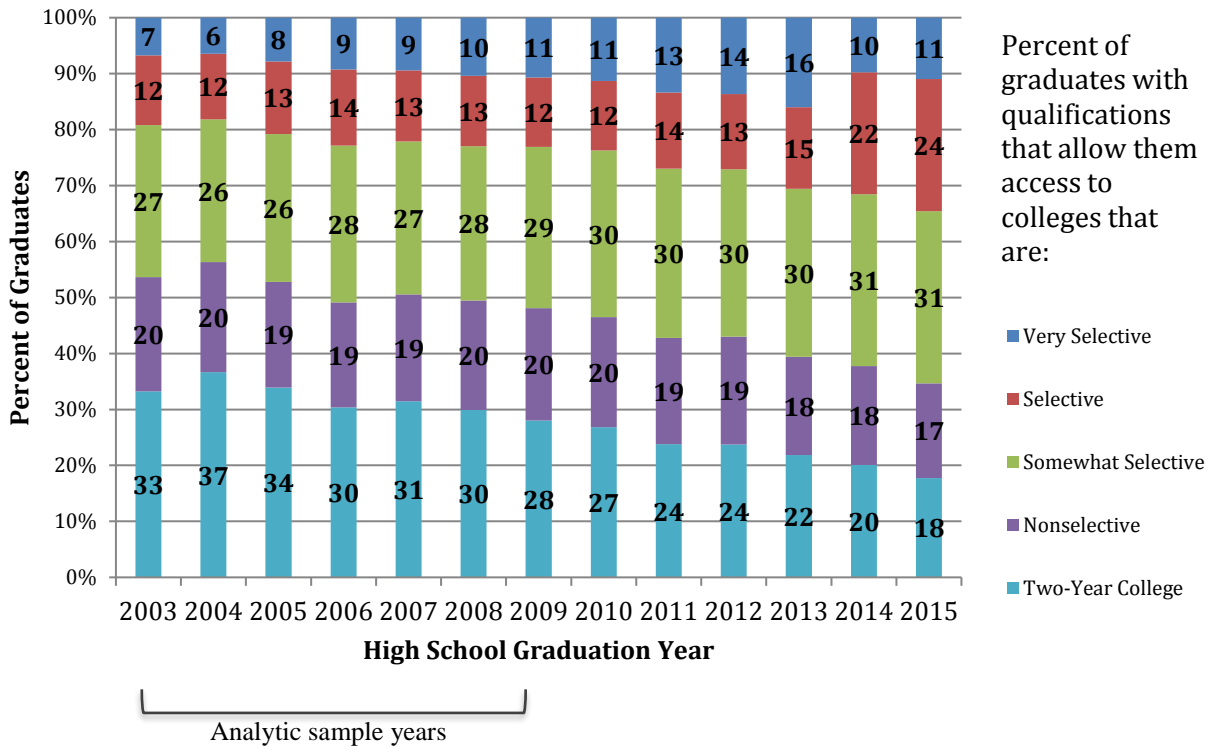
**Figure 1. Growth in CPS Graduates' GPA and ACT**



Note: The figure depicts 10-year trends in mean ACT composite score and mean cumulative GPA for CPS graduates between 2003-15 (n=216,607). The above data excludes graduates from charter schools and alternative enrollment schools due to lack of grade data and lack of comparable grade data (respectively). Ranges of the Y-axis values are equal to approximately one standard deviation in each unit of measure (plus or minus one-half a standard deviation around the mean). Cumulative GPA is reported on a 4.0 scale.

Together, steady gains in ACT score and GPA have translated to a substantial increase in the percent of students with access to selective and very selective colleges, from 19 percent in 2003 to 35 percent in 2015. These students are highly qualified for college admissions; with a mean unweighted GPA above a 3.3, and the mean ACT composite of 24. Whether improvements in ACT and GPA—and subsequently college access—will translate into increases in college completion is an empirical question we examine in the next section of this report. To do so, we will examine college completion outcomes for CPS graduates from the classes of 2003 through 2009, and compare how relative increases in GPA and ACT may impact students' college completion prospects.

**Figure 2. Increases in Student GPA and ACT Translate to Greater Access to Four-year College**



Note: The college selectivity category to which a student has access is determined based on their high school GPA and ACT score, using the rubric detailed in *Potholes on the Road to College* (Roderick et al., 2008), a previous report in the *From High School to the Future* series (see Table B.2 in Appendix B). This graph includes students who graduated from CPS high schools between 2003 and 2015 (N= 216,607). Students from alternative high schools, charter high schools, and some special education programs are excluded because of a lack of comparable grade data.

## To What Extent Would Improving Students’ GPAs and ACT Scores Improve Their Probability of Graduating from College?

### Simulations 1, 2

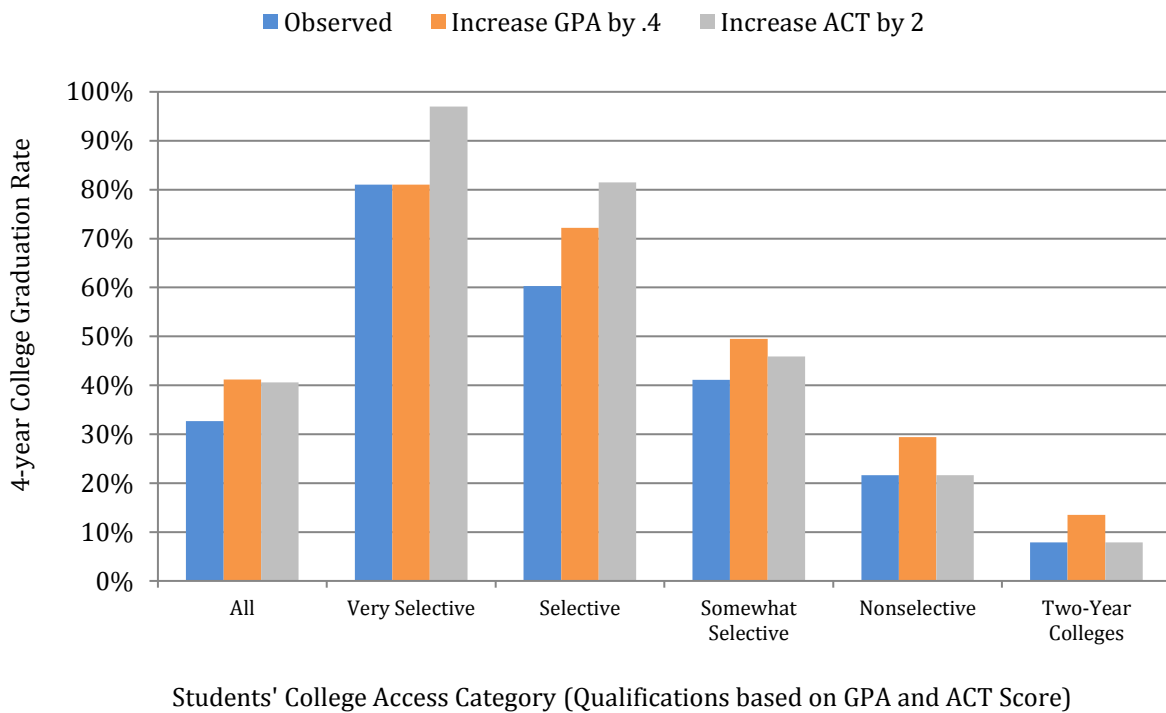
Previous Consortium research has demonstrated that academic qualifications are strong predictors of whether CPS students will attend college the fall after graduating from high school.<sup>10</sup> Furthermore, colleges and universities rely on students’ GPAs and entrance exam scores (like the ACT) to make college admissions decisions, with higher academic qualifications unlocking access to more selective colleges—often with higher graduation rates. While previous research has substantiated the link between high school GPA and college completion, the link between standardized test-scores and college completion is not as clear. Thus, this report examines the increases in GPA and ACT separately (as

<sup>10</sup> Roderick et al. (2006).

opposed to creating a single indicator such as college access category), to better understand how each factor impacts college completion prospects.

In our first analysis, we ran two simulations: increasing students' cumulative GPAs by 0.4 points, and increasing students' ACT scores by 2 points (each margin reflects approximately one-half of a standard deviation). Initially, we examined the impact of raising qualification on student likelihood of simply enrolling in college. When college enrollment is the outcome of concern, raising ACT by 2 points has a greater impact on college enrollment than similar increases in GPA for students in the very selective and selective categories. However, as illustrated in Figure 3, for the vast majority of CPS graduates with access to two-year, nonselective, and somewhat selective colleges, increasing GPA has a greater potential impact on college enrollment than increasing ACT.

**Figure 3. When Considering College Enrollment Increases in ACT and GPA Have Different Impacts for Different Students**

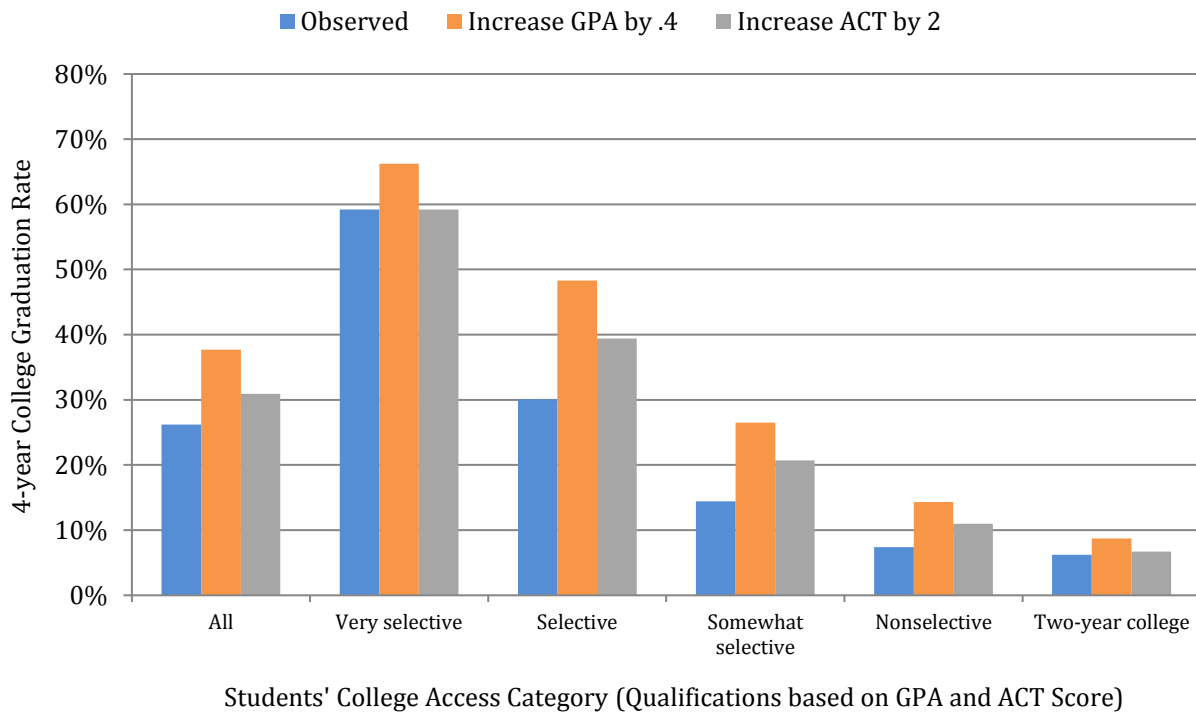


Note: These numbers are for graduating classes of 2003-09 (n= 112,096), excluding students from alternative high schools, charter high schools, and special education programs. Mean GPA and ACT for students within the following college selectivity categories are: very selective (3.3, 26), selective (3.1, 21), somewhat selective (2.6, 18), nonselective (2.0, 16), and two-year college (< 2.0, < 16). Probability of enrollment refers to student's probability of enrolling in a four-year college by the fall immediately following high school graduation.

As important as it is to ensure students have access to four-year college, access alone is not enough; there remains a concerning gap between college enrollment rates and college graduation rates. If the goal is not simply college enrollment but college completion, focusing on gains in GPA is more effective than focusing on ACT. Figure 4 compares increases in graduation rate by relative improvements in GPA and ACT (both for all students as well as broken down by college access category). These results suggest that improvements in GPA have greater impact on college completion rates than ACT for students of all

academic qualifications. This difference is particularly striking for students with qualifications that grant them access to selective and somewhat selective colleges.

**Figure 4. Increasing GPA has a Larger Impact on College Graduation than ACT Score for All Students**



Note: This graph includes students who entered a four-year college in the fall immediately following high school graduation (n=36,609). These numbers are for graduating CPS classes of 2003-09, excluding students from alternative high schools, charter high schools, and some special education programs. Mean GPAs and ACTs for students within the following college selectivity categories are: very selective (3.3, 26), selective (3.1, 21), somewhat selective (2.6, 18), nonselective (2.0, 16); and two-year college (< 2.0, < 16). Probability of college graduation refers to the probability of earning a bachelor's degree within four years of high school graduation.

However, since the academic qualifications for the majority of CPS students are so low, even a 0.4 increase in cumulative GPA or a 2-point increase in ACT score would lead to little improvement in the college completion prospects of many CPS graduates. Take, for instance, the nearly one-quarter of CPS graduates in 2015 who had qualifications that only granted them access to two-year colleges. Increasing the academic qualifications of these students would only lead to a 2.5 percentage-point increase in college graduation rate; because college graduation rates for these students are so low, even with this 2.5 percentage-point increase, the resulting college graduation rate for these students would not exceed 10 percent. The gravity of such a fact is astounding: even if we significantly increase the qualifications of the bottom one-third of CPS graduates, we would still estimate that nine out of 10 of these students would not complete a bachelor's degree four years after graduating high school. Such a reality points to the need for dramatic improvements in academic qualifications for large numbers of CPS graduates.

## Rethinking the Meaning of High School GPA

Despite improving academic qualifications amongst CPS high school graduates, moving GPA at the district level has proved to be a difficult undertaking. In the remainder of this section, we examine the complex phenomenon of GPA across high schools, and question some of the fundamental conceptualizations of GPA that have shaped our understanding of inequities in college completion.

### Differences in GPA as a Reflection of Schools Not Students

A consistent finding in the broader literature is that once in college, a student's high school GPA is the most important predictor of their performance in college.<sup>11</sup> Despite the evidence, this statement seems implausible to many high school educators, who are concerned about the potential subjectivity of GPA. While it is true that differences in GPA across high schools can be quite large, the meaning and implications of these differences are more complicated than they may first appear.

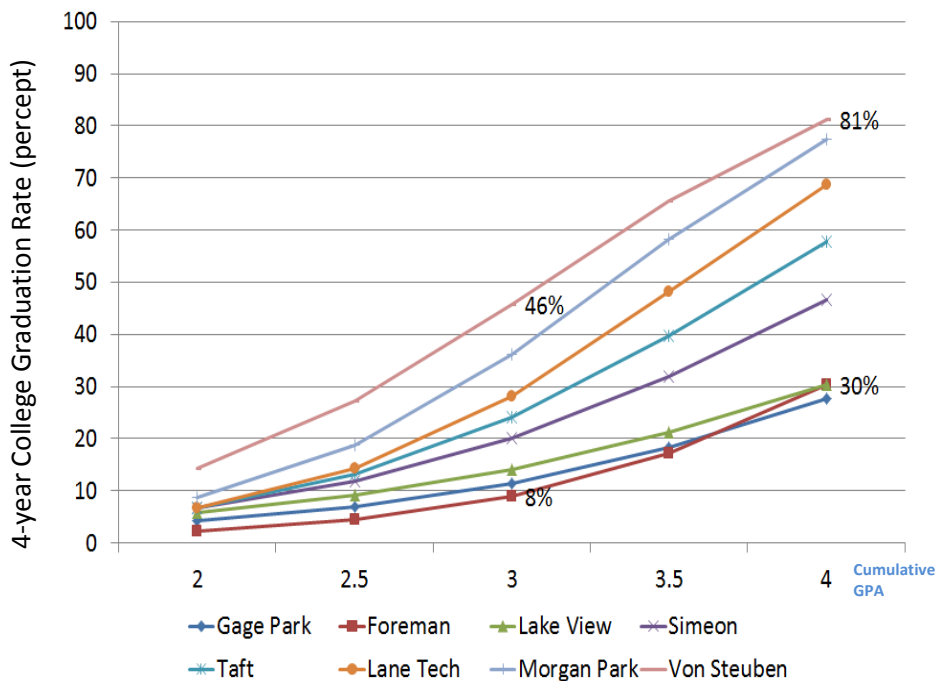
For instance, if we look at the college outcomes of CPS students from high schools of varying type, racial and ethnic composition, and neighborhood, GPA appears to function differently in predicting a student's chances of graduating college, based upon what high school the student attends. As an example we offer a comparison of the following eight high schools: Lane Tech, Foreman, Morgan Park, Simeon, Von Steuben, Gage Park, Taft, and Lake View. Lane Tech is a selective enrollment high school with competitive admissions based on students' academic qualifications. Von Steuben is a magnet school, meaning students must self-select into the school environment. Lake View, Gage Park, and Taft high schools are all neighborhood high schools of mixed racial and ethnic composition. Foreman and Morgan Park are both neighborhood high schools with predominantly Latino and Black student populations respectively. Lastly, Simeon is a career preparatory high school on the South Side of Chicago with a predominantly Black student population. Lake View, Foreman, and Taft High Schools are located on Chicago's North Side. Von Steuben and Lane Tech are located on the North-West Side of Chicago, and Morgan Park and Gage Park are located in communities on Chicago's South-West Side.

Given potential differences in student population across these eight schools, it is not surprising to see substantial differences in college completion rates for students with similar GPAs. Among college-goers, those graduates from Von Steuben who earned a B average in high school were more than four times as likely to graduate from college within four years as graduates from Gage Park who earned that same B average. The gap between high schools widens as students' GPAs improve; a college-goer who graduates from Gage Park with a 4.0 GPA has only about a 30 percent chance of graduating from college, compared to a more than 80 percent chance for the same student graduating from Von Steuben. Based upon this evidence alone, it is logical for educators to assume that grades are not a good measure for comparison of college readiness across schools.

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<sup>11</sup> Geiser & Santelices (2007); Bowen et al. (2009).

**Figure 5. Across CPS High Schools, Similar GPAs Yield Very Different Chances of Graduating from a Four-Year College, a Gap that Only Widens As GPA Increases**



Note: This graph includes students from eight high schools who attended a four-year college by the fall immediately following their high school graduation. These numbers are for graduating CPS classes of 2003-09.

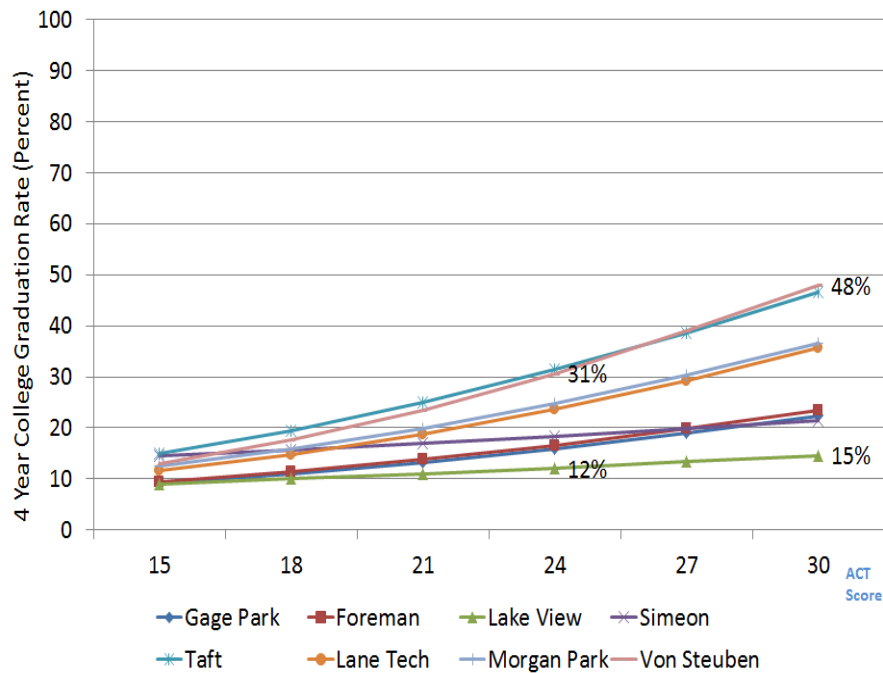
At first glance, Figure 5 would seem to present strong evidence that similar grades do not measure the same level of performance across high schools. This is why many educators and policymakers argue that you need independent and more objective measures, such as ACT scores. The problem, however, is that we observe the same general pattern of results when we look at the relationship between ACT scores and college graduation rates for graduates of different high schools.

Across high schools, differences in the college graduation rates of similarly-qualified students are not negligible. College-goers from Von Steuben with an ACT of 24 were more than twice as likely to graduate within four years as students from Gage Park with an ACT of 24, a difference that is larger than the within-school difference between ACT scores of 15 and 30 in all but one of the high schools in Figure 5.

Much of the difference between high schools in college outcomes for similarly-qualified students remains, even when using an objective measure such as ACT. Such differences suggest that a good portion of the disparities in college outcomes between high schools is due to something other than academic preparation alone.



**Figure 6. Across CPS High Schools, Similar ACT Scores Yield Very Different Chances of Graduating from a Four-Year College**



Note: This graph includes students from these eight high schools who attended a four-year college by the fall immediately following their high school graduation. These numbers are for graduating CPS classes of 2003-09, excluding students from alternative high schools, charter high schools, and some special education programs.

## What Drives Differences in the Payoffs to ACT Scores and GPAs across High School?

### The Role of College Choice

So far, this report has examined the payoffs to college from increasing students’ qualifications: Test scores and grades. In addition to these two pathways, high schools can also influence their students’ likelihood of graduating from college by shaping those students’ college choices. Previous Consortium research concluded CPS students—especially those with high GPAs and ACT scores—commonly undermatch in their college choice; that is, they attend colleges with admissions criteria below those to which their academic qualifications allow them to attend.<sup>12</sup> In their book, *Crossing the Finish Line*, Bowen et al. (2009) replicated this research using data from North Carolina.<sup>13</sup> They concluded that college undermatch was common among highly-qualified, low-income students and that college undermatch may contribute significantly to racial/ethnic and income gaps in college graduation rates. Other researchers have found evidence of students undermatching throughout the country.<sup>14</sup> In short, this prior research, based both in Chicago and elsewhere, strongly indicates that college choice influences students’ likelihood of graduating from college within four years.

In order to examine the effect of college choice, we created a new variable—the “expected graduation rate”—which assigns students an expected graduation rate, based on the college they chose to attend, regardless of the student’s own qualifications. For example, the four-year graduation rate for a local Chicago public university is 34 percent and the four-year graduation rate for another local public

<sup>12</sup> Based on Barron’s selectivity categories as described in Roderick et al. (2008).

<sup>13</sup> Bowen et al. (2009).

<sup>14</sup> Hoxby & Avery (2013); Avery, Howell, & Page (2014).

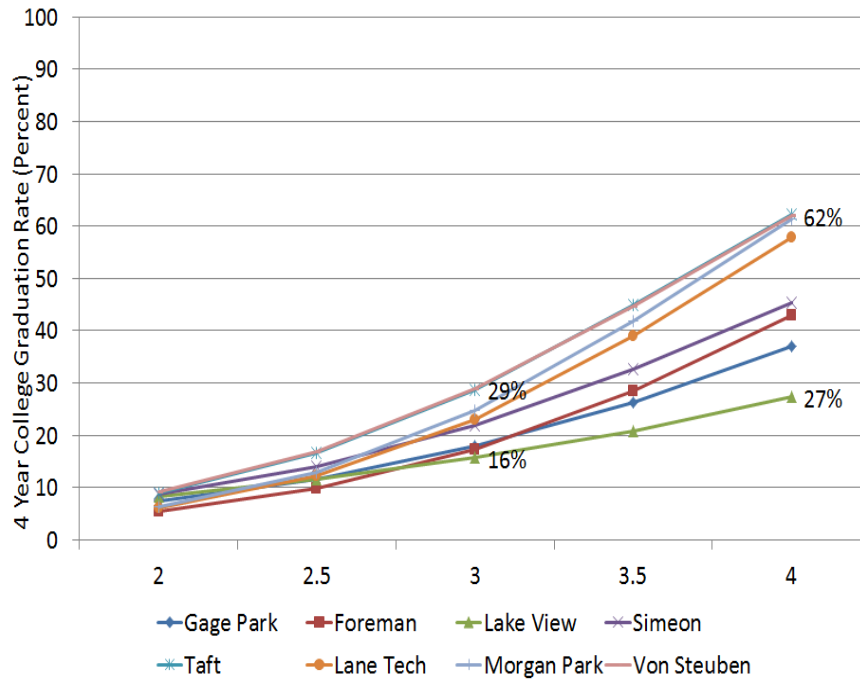
university is 2 percent.<sup>15</sup> If all students in a high school attended the first college, we would expect, on average, for these students to have a 34 percent chance of graduating without considering any additional information on these students. Similarly, if that high school sent one-half of their students to the lower-graduating college and one-half to the higher-graduating college, we would expect roughly an 18 percent four-year graduation rate if those students performed at the average rate of others at that college.

Figure 7 demonstrates how accounting for the colleges that students from a given high school attend decreases differences in expected college graduation rate for students with similar GPAs. Consider again the college outcomes for students at two high schools: Higher-performing Von Steuben and lower-performing Gage Park. Figure 5 shows a more than 30-point gap between the two high schools in the college graduation rate for students with a 3.0 GPA. Although a gap still exists once the colleges those students attend are accounted for (Figure 7), the new gap is only half as wide as the previously observed gap (16 points). For students with a 4.0 GPA, the gap in graduation rate between the two schools is also cut in half, from a 50-point difference to a 25-point difference. This pattern of narrowing between-school gaps in graduation rate for students with the same GPA extends to all high schools shown on Figures 5 and 7. About half of what looks like differences in the value of a GPA from different high schools can be attributed to differences in college selection patterns across high schools.

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<sup>15</sup> As reported to the National Center for Education Statistics for first-year students who enrolled in 2009.

**Figure 7. College Enrollment Patterns Drive Much of the Between-School Differences in CPS Students' Four-Year College outcomes**



Note: This graph includes students from these eight high schools who attended a four-year college by the fall immediately following their high school graduation. These numbers are for graduating CPS classes of 2003-09, excluding students from some special education programs.

These figures demonstrate that students' college choices can make a potentially large difference in the extent to which they are able to translate their high school qualifications into college success, and that there are differences in college choice based on the high school students attend. One way these differences manifest is in the pattern of colleges attended by students from the same high school with differing levels of qualifications.

# Section II: College Choice as a Point of Leverage

If educators and students are to continue to answer the call for increased academic performance, it is essential that the hard work students invest in high school pays off in college. There are two ways that rising academic qualifications can pay off for students: first by improving students' academic preparation for college and second by providing students with access to more selective and better-performing colleges. This second method points to the essential role of college choice.

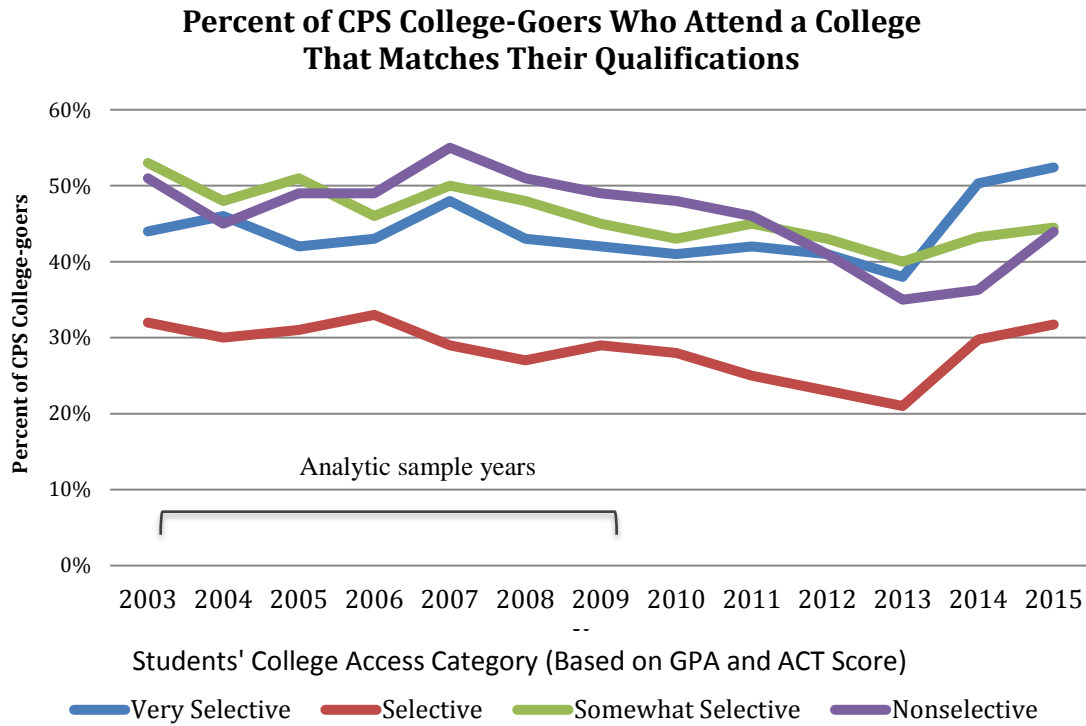
## The Role of College Match

If we want to increase four-year college degree attainment, it is logical that we should consider student inputs that affect college outcomes beyond academic qualifications. An obvious student input beyond GPA and ACT score is the college search, application, and enrollment process. The most common way to conceptualize the college search, application, and enrollment process is through the concept of "college match." When students apply to college, their potential college list is some combination of "reach schools," "safety schools," and "match schools." Reach schools are colleges that are a stretch for a student to gain admissions, given their qualifications; safety schools are colleges to which the student is almost certain to gain admissions; and match schools are colleges where, on average, students who are admitted have comparable qualifications to the student. Thus, the concept of "match" captures whether a student enrolls in a college with a selectivity level that matches the kind of colleges to which a student would likely have been admitted given their high school qualifications.

Although more CPS graduates are attending college, and specifically attending a four-year college, for a 10-year period of time between 2003 and 2013, students were increasingly likely to undermatch in their college choice, that is attend a less selective college than their academic qualifications would allow (see Figure 8). In 2003, 42.7 percent of CPS four-year college-goers undermatched in their college choice; by 2013, that undermatching had risen to 57.7 percent of college-goers. The trend in undermatching was even greater if one expands the view to consider students who attended not only four-year colleges, but also two-year colleges. Any student with academic qualifications to access a four-year college, be it very selective, selective, somewhat selective, or nonselective, is undermatching when they attend a two-year college instead of a four-year college. Of the 3,812 students who attended a two-year college in 2013, 74 percent had academic qualifications that would have gained them access to a four-year college; therefore, these students undermatched.

Dropping match rates makes sense in a district where student qualifications are steadily increasing, thus also increasing competition for existing slots in higher selectivity colleges. In a positive turn, since 2013, match rates have risen for students of all selectivity levels. While college match rates have seemingly rebounded from their 10-year dip, students with above average qualifications (a GPA of 3.1, an ACT score of 21) that can grant them access to selective colleges, remain the most likely students to undermatch in their college choice. In 2013, only 21 percent of students with access to selective colleges attended a college or university that matched their qualifications. By 2015 the match rate for students with access to selective colleges had risen to 32 percent. Despite these gains, in 2015, more than two-thirds of CPS graduates with access to selective colleges, like Loyola or DePaul University, attended a college below their qualifications. Overall, district match rates hover between 40 and 50 percent, making improvements in match a relevant point of discussion, regardless of recent gains.

**Figure 8. After a 10-Year Decline, College Match Rates Are Rising**



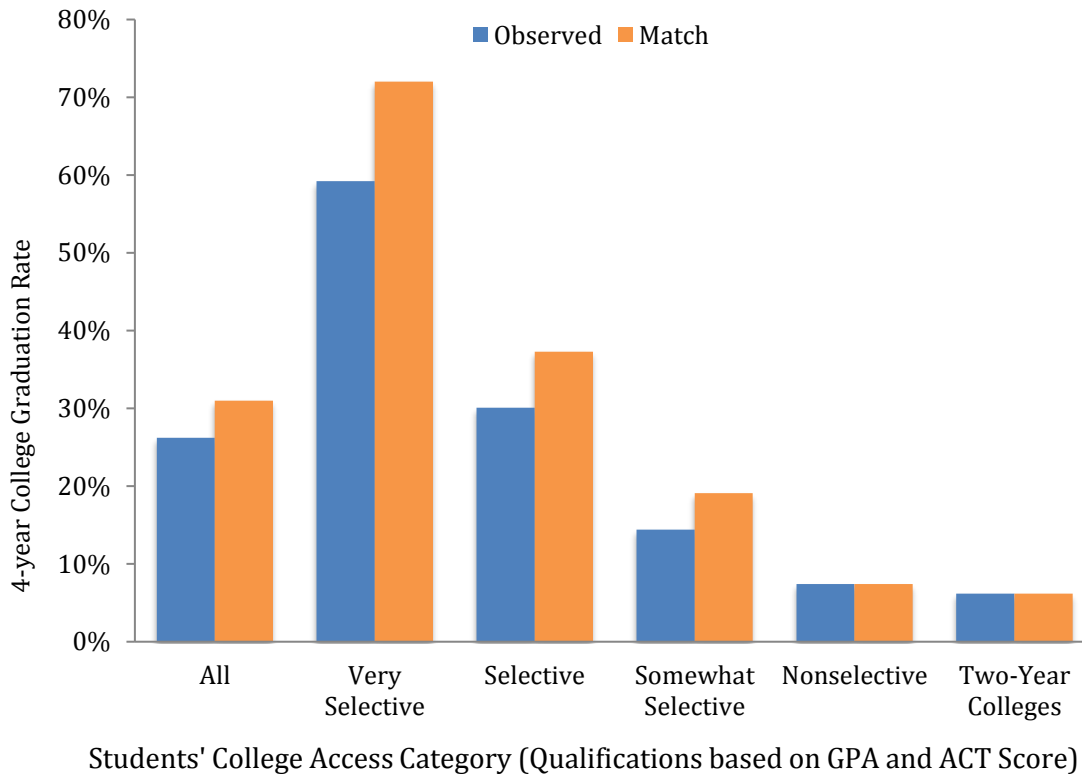
Note: This figure represents the percent of students within each access category who attended a “match” college. College-goers refers to all CPS graduates from the graduating classes of 2003 through 2013 who enrolled in a two-year or four-year college the fall immediately following graduation (n=119,550). Mean GPA and ACT per access category are as follows: Very selective (3.3, 26); selective (3.1, 21); somewhat selective (2.6, 18); nonselective (2.0, 16).

## Improving College Match Can Increase the Probability of College Graduation for Very Selective Students by 13 Percentage Points

### Simulation 3

Figure 9 shows the extent to which students’ college graduation rates would be expected to increase if no students undermatched. When considering all CPS college-goers, ensuring that no students undermatched could lead to a 5-point increase in their four-year college graduation rate.

**Figure 9. Students with the Highest Academic Qualifications have the Most to Gain from Attending a “Match” College**



Note: This figure includes students who attended a four-year nonproprietary college by the fall immediately following their high school graduation. These numbers are for graduating CPS classes of 2003-09 (n=36,609), excluding students from alternative high schools, charter high schools, and some special education programs.

While the overall college graduation rate for CPS graduates would only increase by approximately 5 percentage points, most of this increase is driven by much more substantial gains for students in the very-selective, selective, and somewhat-selective access categories. By matching, these students would attend, on average, colleges with much higher graduation rates. Meaning, simply by attending colleges that match their qualifications, these students would be more likely to see the efforts they invested in high school translate into success in college.

### Moving Beyond College Match

These results indicate that limiting undermatching is one way to improve college degree attainment. However, there are at least four problems with employing match as the singular strategy to improving college degree attainment.

- Match is a relatively blunt way of grouping students, placing them in just five categories that account only for their GPA, ACT score, and, in some circumstances, the honors or Advanced Placement courses they took (see Appendix B). Although these factors are very important for college access and success, they do not account for additional factors that can affect students’ college success, such as economics, demographics, or any other factor beyond academic qualifications.

- The college match framework is also a blunt way of grouping colleges and universities. Within each selectivity category, there are wide differences in college graduation rates. For example, both a local private university and a local public university are somewhat selective colleges that CPS students attend; the local private university’s four-year graduation rate is 48 percent and the local public university’s is 2 percent. Yet a student could match by attending either. Indeed, there is wider variation in institutional graduation rates within selectivity categories than there is across them.
- College match does not help all students in our sample. By definition, low-achieving students are not undermatching as long as they attend any four-year college—as a result, they do not see any benefit by employing a college match strategy.
- As demonstrated in Table 2, the majority of CPS students attend a small cluster of colleges, all of which are in the state of Illinois. However, the public college options in Illinois severely limit the opportunities for attending a “match” college. The University of Illinois at Urbana-Champaign is the only public college that is more than somewhat selective; it is classified as very selective. That means that for students who have qualifications for selective colleges, there are no public, in-state options.

While attending a “match” college may hold certain benefits for students on the upper end of college selectivity, encouraging students to attend a “match” college is by no means the single solution for increasing college completion. There remains a difficult problem with which to grapple. Why is it that students with comparable qualifications can go to different colleges that both match those qualifications and still have radically different college outcomes? The answer to this question is both simple and unsatisfying: variability. While college graduation rates *tend* to be higher at institutions with higher selectivity, there remains a good deal of variation in graduation rates within each selectivity category. For example, CPS students with qualifications that grant them access to somewhat selective colleges could attend several different colleges in the Chicago area. Students attending any of these colleges would therefore be attending a “match” college. However, not all “match” colleges perform equally well for CPS graduates with access to somewhat selective colleges. Similarly-qualified CPS graduates at two of these colleges have dramatically different four-year graduation rates: 48 percent at one school vs. 2 percent at the other.<sup>16</sup>

Further complicating the use of college match is the knowledge that many CPS students have academic qualifications so low that attending any four-year—even the lowest-performing four-year college—means that the student is matching (or even overmatching) in their college choice. Thus, while focusing on a college’s selectivity level can be valuable in narrowing the scope of potential colleges students consider, selectivity category alone should not be the only criteria considered when building a college choice set.

## College Choice in Chicago Public Schools

College choice is clearly important, but for many teachers and counselors, working on college choice is both every bit as daunting and as fraught with misconceptions as efforts to raise student achievement. There are more than 2,500 four-year colleges in the United States, including more than 100 in the state of Illinois. Despite the plethora of four-year college options for graduating students, the majority of CPS students in our sample attended a remarkably narrow cluster of colleges. Although, CPS graduates from the 2003-09 cohorts attended hundreds of different colleges, almost 60 percent of the four-year college-goers in our sample attended one of 10 Illinois colleges, and nearly 30 percent attended just three colleges. The graduation rates at these top 10 colleges varied substantially. In the next section we examine

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<sup>16</sup> As reported to the National Center for Education Statistics for first-year students who enrolled in 2009.

the potential impact that improving students’ college choice strategies could have on their likelihood to complete college.

**Table 2. Most Students Attended Colleges with Low Prospects of Graduation**

| <b>Top 10 Colleges CPS Students Attend</b> | <b>Percent of CPS College-goers</b> | <b>CPS Four-Year Graduation Rate for CPS Graduates</b> |
|--|-------------------------------------|--|
| Local Public University                    | 11.9%                               | 19.4%  |
| Local Public University                    | 8.9%                                | 4.4%   |
| Large Public University                    | 8.5%                                | 54.6%  |
| Midsized Public University                 | 6.3%                                | 7.1%   |
| Midsized Public University                 | 4.8%                                | 12.3%  |
| Local Public University                    | 4.7%                                | 2.4%   |
| Local Private University                   | 4.6%                                | 44.7%  |
| Local Arts College                         | 3.0%                                | 17.3%  |
| Local For-Profit University                | 3.1%                                | 25.4%  |
| Local Private University                   | 2.5%                                | 44.5%  |

Note: These are the most commonly attended four-year colleges for students in the sample. Students who began at a two-year college and transferred to a four-year college are not included in these totals. CPS graduation rate represents the percentage of CPS graduates from 2003-09 (n=36,609) enrolling in college that earned a bachelor’s degree four years after high school graduation.

### College Choice Would Cause Districtwide College Completion Rates to Rise by 11 Percentage Points

In dramatic contrast, a college choice strategy focused on helping students avoid colleges that underperform addresses all of these issues: the potential of improvement for students of all qualifications, a focus on choosing colleges based on the probability of the student graduating, and the incorporation of a wider range of student factors beyond just academic qualifications.

Comparing college performance is a delicate and complicated issue. Colleges and universities differ vastly in the students they serve, and college selectivity closely mirrors the academic qualifications of the students in attendance. As a result, higher education institutions and scholars express concern that colleges and universities will be compared to one another with little regard to the different types of students they enroll and serve. For example, a college with a mission focused on providing educational opportunity to low-income students who graduate from high school with academic deficiencies would expect to have a lower graduation rate than a college that largely serves more affluent students with higher academic skillsets.

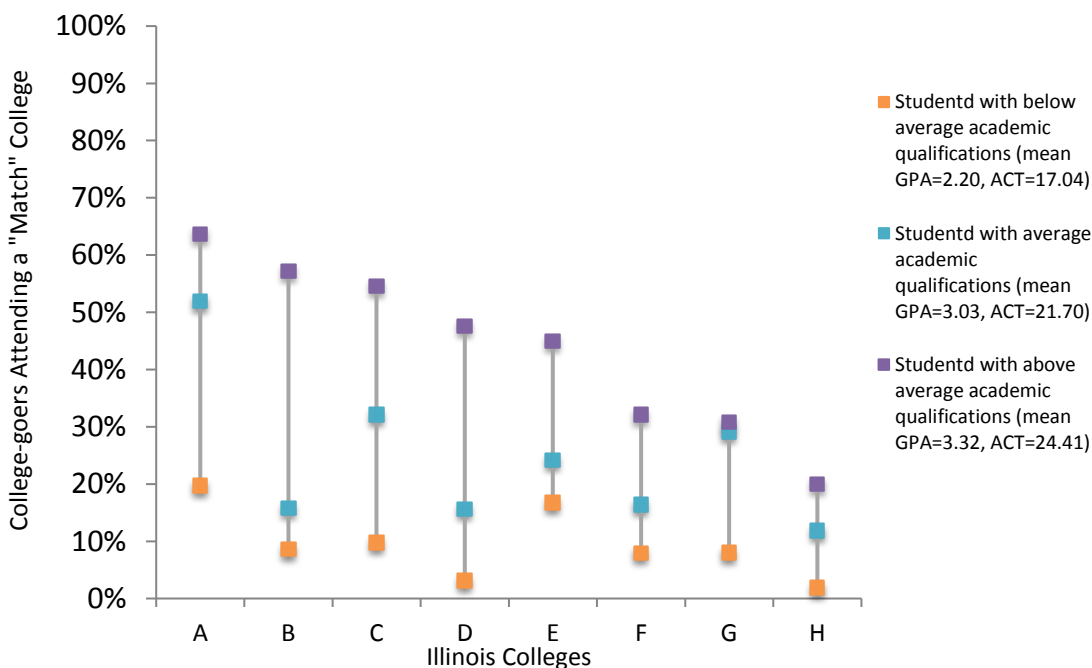
For this reason, simply pointing to a college’s graduation rate or selectivity is not a sufficient way of determining how well the college is performing for its students. To this end, for our fourth simulation, we



have developed a method of understanding colleges' and universities' performance for the different students that they enroll. This allows us to estimate the probability of graduation for a specific student at a specific college, based both on the students' characteristics and the college's performance with similar students.

Figure 10 illustrates this analysis for three groups of students: 1) Those with below-average qualifications, 2) those with average qualifications, and 3) those with above-average qualifications. For each group, we first calculated a probability of college graduation based on each student's GPA, ACT score, race, gender, type of high school, and economic variables. This predicted probability does not include the positive or negative effects of attending a specific college. The figure shows a sample of colleges that CPS students with similar predicted probabilities of graduation attend, as well as the actual graduation rates of those students at those colleges. As Figure 10 illustrates, CPS students with similar predicted probabilities of graduating can have vastly different outcomes when attending different colleges. Considering that most CPS graduates attend only a handful of local colleges and universities, current college-enrollment patterns suggest a massive talent loss at some colleges. On the other hand, students at some colleges tend to graduate at higher levels than expected.

**Figure 10. Students with Similar GPAs and ACTs Have Vastly Different College Outcomes Depending on Where They Attend College**



Note: The above figure represents the actual college outcomes of a subgroup of CPS graduates between 2003-09 who attended eight different colleges immediately following high school graduation (n= 7,995). Color groups correspond to groups of students clustered by their predicted probability of earning a four-year degree in four years, based upon their high school academic performance and demographic information. Students with the lowest college prospects (less than a 10 percent likelihood of earning a four-year degree in four years) are represented by the orange markers. Students with a 20 percent to 30 percent likelihood are represented by the blue markers and also reflect the prospects of the "average" CPS graduate. Lastly, students with purple markers have predicted probabilities of 40 percent to 50 percent of earning a four-year degree in four years. College A (n= 870), College B (n=1,309), College C (n=810), College D (n=1,631), College E (n=265), College F (n=1,946), College G (n=168), College H (n=2,344).

As students' GPAs and test scores increase, so does the importance of college choice. Students with below-average qualifications saw an 18-point difference in graduation rate between College A and College H (20 percent vs. 2 percent). However, students with above average qualifications saw a 44-point difference in four-year graduation rate at the same two schools (64 percent vs 20 percent).

Take for instance, the college outcomes of CPS college-goers with above average academic qualifications; these students are represented by the purple markers in Figure 10. At College A (a nonselective private school in Chicago) nearly 65 percent of these students earned a four-year degree in four years. This is far above their expected graduation rate of 40 to 50 percent. While College A overperforms for this group of students, this is not the case for all schools. Table 3 presents the graduation rates for students with above-average qualifications. Grouping students with a similar probability of graduating from college (between 40 and 50 percent, in the 2003-09 graduating cohorts) allows us to compare how institutions perform for this subgroup of students. For this subsample of students, a nonselective private school, a somewhat selective public school, and a nonselective arts school all perform better than expected. As encouraging as these prospects might sound, more schools underperform for above average students than over perform.

**Table 3. For Highly-Qualified Students College Choice Matters Considerably**

| College choice set for student with above average qualifications |       |  |
|--|-------|--|
| Estimated probability of Graduation=40-50 Percent                |       |  |
| Institution  | Count | Observed CPS Four-Year Graduation Rate |
| <b>Nonselective Colleges</b>                                     |       |  |
| Local Public University  | 134   | 14%                                    |
| Local Arts College   | 52    | 50%                                    |
| Local For-Profit University                                      | 28    | 57%                                    |
| <b>Somewhat Selective Colleges</b>                               |       |  |
| Local Public University  | 25    | 12%                                    |
| IL Public University   | 94    | 19%                                    |
| Local Public University  | 735   | 19%                                    |
| Local Private University   | 28    | 25%                                    |
| IL Public University   | 32    | 28%                                    |
| Local Private University   | 40    | 38%                                    |
| IL Public University   | 37    | 43%                                    |
| Out-of-State HBCU  | 48    | 48%                                    |
| Local Private University   | 21    | 71%                                    |
| <b>Selective Colleges</b>  |       |  |
| Out-of-State Public University                                   | 33    | 30%                                    |
| Public Flagship University                                       | 29    | 35%                                    |
| Local Private University   | 177   | 38%                                    |
| Local Public University  | 282   | 49%                                    |
| Small Private University   | 29    | 52%                                    |
| Public Flagship University                                       | 27    | 56%                                    |
| <b>Very Selective Colleges</b>                                   |       |  |

|  |     |     |
|--|-----|-----|
| Local Private University   | 50  | 14% |
| Public Flagship University   | 492 | 55% |
| Public Flagship University   | 22  | 82% |
| Colleges with the highest and lowest observed mean graduation rates for students with a 40 to 50 percent predicted probability of completing college by college selectivity level. |     |     |
| Only institutions with n>20 are depicted.  |     |     |

College outcomes are equally as convoluted for CPS college-goers with slightly lower qualifications. CPS college-goers with “average” college graduation prospects have just a 20 to 30 percent chance of graduating in four-years. For these students—represented by the blue markers in Figure 10—there seems to be little consistency in graduation rates. At almost all colleges, CPS graduates with average qualifications have lower college completion prospects than their higher-qualified peers; however, the degree to which this statement is true varies greatly. For instance, at College A (the same nonselective private university that over-performed for students with above average qualifications) students with “average” qualifications also have better outcomes than expected. If we compare the “gain” in college graduation rate that both groups of students received by attending this particular college, it becomes clear that for students with “average” qualifications, this college is particularly beneficial (52 percent observed graduation rate versus 20-30 percent predicted graduation rate). While College A over-performs for CPS graduates with average qualifications—as Table 4 illustrates—most colleges underperform for average students, and some grossly so.

**Table 4. Highest and Lowest Performing Colleges for Students with Average Qualifications**

| College choice set for student with average qualifications |       |  |
|--|-------|--|
| Estimated probability of Graduation=20-30 Percent          |       |  |
| Institution  | Count | Observed CPS Four-Year Graduation Rate |
| <b>Nonselective Colleges</b>                               |       |  |
| Local Public University                                    | 734   | 3%                                     |
| Small Public University                                    | 22    | 9%                                     |
| Public HBCU  | 68    | 10%                                    |
| Public HBCU  | 31    | 13%                                    |
| Public HBCU  | 22    | 23%                                    |
| Private Arts College                                       | 219   | 23%                                    |
| <b>Somewhat Selective Colleges</b>                         |       |  |
| Local Public University                                    | 346   | 4%                                     |
| Midsized Public University                                 | 47    | 6%                                     |
| Midsized Public University                                 | 494   | 7%                                     |
| Small Private University                                   | 28    | 7%                                     |
| Local Public University                                    | 800   | 7%                                     |
| Large Public University                                    | 289   | 11%                                    |

|  |     |     |
|--|-----|-----|
| Local Private University   | 63  | 11% |
| Midsized Public University   | 324 | 16% |
| Midsized Public University   | 103 | 17% |
| Local Private University   | 123 | 17% |
| Small-Public University  | 88  | 19% |
| Local Private University   | 55  | 26% |
| Private HBCU   | 72  | 29% |
| Private HBCU   | 36  | 42% |
| Local Private University   | 53  | 43% |
| <b>Selective Colleges</b>  |     |     |
| Local Private University   | 77  | 8%  |
| Public Flagship University   | 21  | 10% |
| Local Private University   | 92  | 12% |
| Public Flagship University   | 21  | 14% |
| Small Private University   | 40  | 15% |
| Out-of-state Public University   | 28  | 22% |
| Local Private University   | 276 | 25% |
| Out-of-state Public University   | 34  | 27% |
| Public Flagship University   | 35  | 29% |
| <b>Very Selective Colleges</b>   |     |     |
| Local Private University   | 24  | 8%  |
| Public Flagship University   | 375 | 36% |
| Colleges with the highest and lowest observed mean graduation rates for students with a 20 to 30 percent predicted probability of completing college by college selectivity level. |     |     |
| Only institutions with n>20 are depicted.  |     |     |

College outcomes for students with below-average qualifications are disturbingly grim. Table 5 presents the college graduation results for students with very low probability of earning a degree in four years. At only one school in our sample do students with low academic qualifications have above a 20 percent chance of earning a four-year degree in four-years. For students with low academic qualifications, there is no enrollment strategy—either with college match or college choice—that would alter the odds of graduating in four-years in any substantial way.

**Table 5. College Graduation Outcomes for Students with Very Low Qualifications**

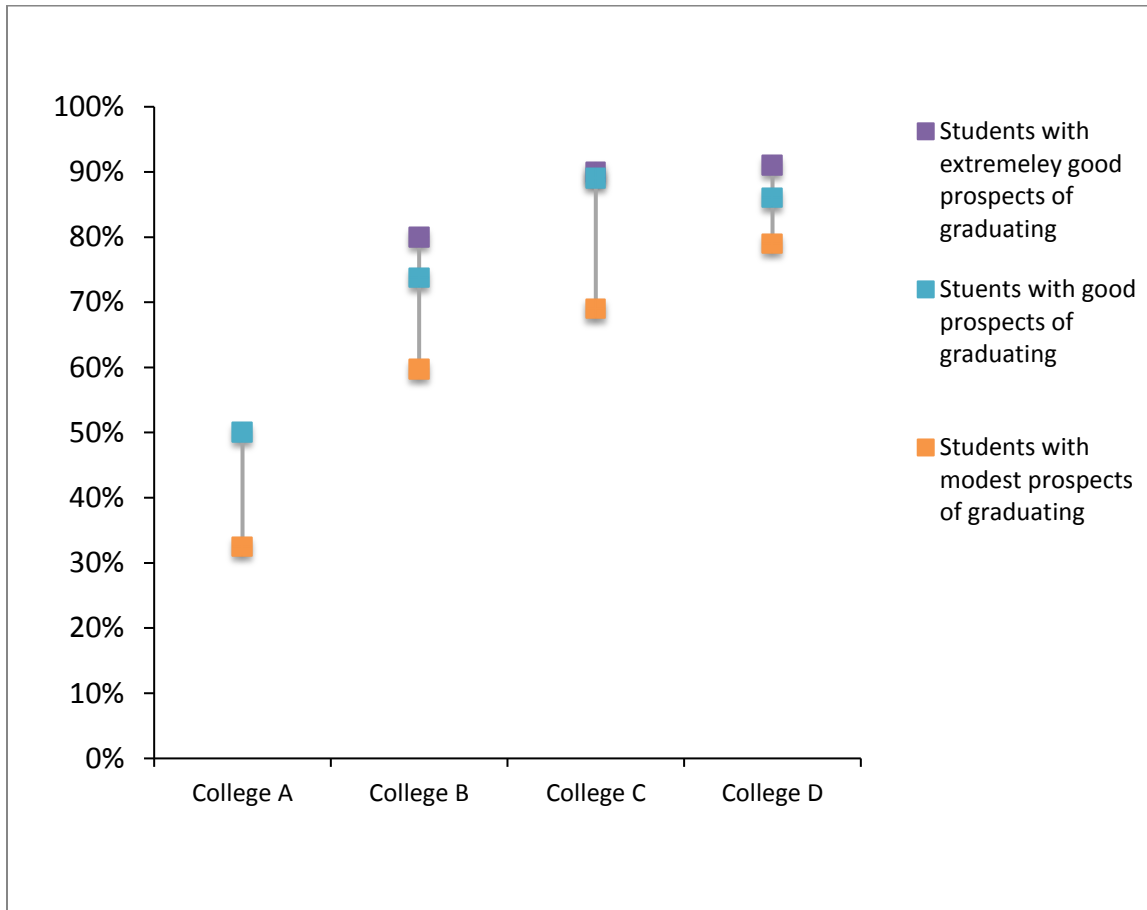
| Institution            | Count | Observed<br>CPS Four-<br>Year<br>Graduation<br>Rate | Selectivity        |
|------------------------|-------|---|--------------------|
| Private HBCU           | 23    | 0%  | Nonselective       |
| Public HBCU            | 24    | 0%  | Nonselective       |
| Public HBCU            | 36    | 0%  | Nonselective       |
| Local-Public Univ.     | 154   | 0%  | Nonselective       |
| Private Arts College   | 125   | 3%  | Nonselective       |
| Public HBCU            | 30    | 7%  | Nonselective       |
| Local Private Univ.    | 95    | 7%  | Nonselective       |
| Local For-Profit Univ. | 165   | 9%  | Nonselective       |
| Local Private Univ.    | 37    | 11%   | Nonselective       |
| Rural Private College  | 30    | 23%   | Nonselective       |
|                        |       |   |                    |
| Public HBCU            | 84    | 0%  | Somewhat Selective |
| Local Private Univ.    | 149   | 1%  | Somewhat Selective |
| Midsized Public Univ.  | 197   | 1%  | Somewhat Selective |
| Midsized Public Univ.  | 199   | 3%  | Somewhat Selective |
| Small Public Univ.     | 20    | 5%  | Somewhat Selective |
| Public HBCU            | 58    | 7%  | Somewhat Selective |
| Public HBCU            | 32    | 9%  | Somewhat Selective |

Only institutions with n>20 are depicted.

For low-achieving students who only have the academic qualifications to access less selective colleges (Table 5), the likelihood of attending a college where they have virtually no chance of success is high. At several of these colleges, not a single one of these students graduated within four years. While low graduation rates underscore the struggles poorly-qualified students can expect in college, not all students with low qualifications struggle equally at all campuses. Such variation in degree attainment indicates that it is possible to better serve even poorly qualified students.

So far, we have presented college outcomes for students of low to moderate college prospects. A consistent theme for all groups of students is variability in college performance. As Figure 11 illustrates, variation in student outcomes is an important theme even amongst elite colleges and universities. Figure 11 illustrates the wildly varying levels of success of CPS graduates enrolled at several elite universities in Illinois. Attending a very-selective college did not guarantee students similar college graduation prospects. As illustrated below, College A underperformed for both students with modest and good prospects of graduation (40-50 percent and 60-70 percent respectively). Alternatively, College D clearly over-performed for similar students.

**Figure 11. Even Amongst Elite Colleges Students with Similar ACTs and GPAs Can Have Vastly Different College Graduation Outcomes**



Note: The above figure represents the actual college outcomes of a subgroup of CPS graduates between 2003-09 who attended four different very selective colleges immediately following high school graduation (n= 1,026). Color groups correspond to groups of students clustered by their predicted probability of earning a four-year degree in four years based upon their high school academic performance and demographic information. Students with moderate college prospects (between 40 percent and 50 percent likelihood of earning a four-year degree in four years) are represented by the orange markers, students with good college prospects (between 60 percent and 70 percent likelihood of earning a four-year degree in four years) are represented by the blue markers, and students with extremely good college prospects (between 80 percent and 90 percent likelihood of earning a four-year degree in four years) are represented by the purple markers. College A (n=69), College B (n=742), College C (n=109), College D (n=106).

## How Would Avoiding Underperforming Colleges Improve Students' Graduation Rates?

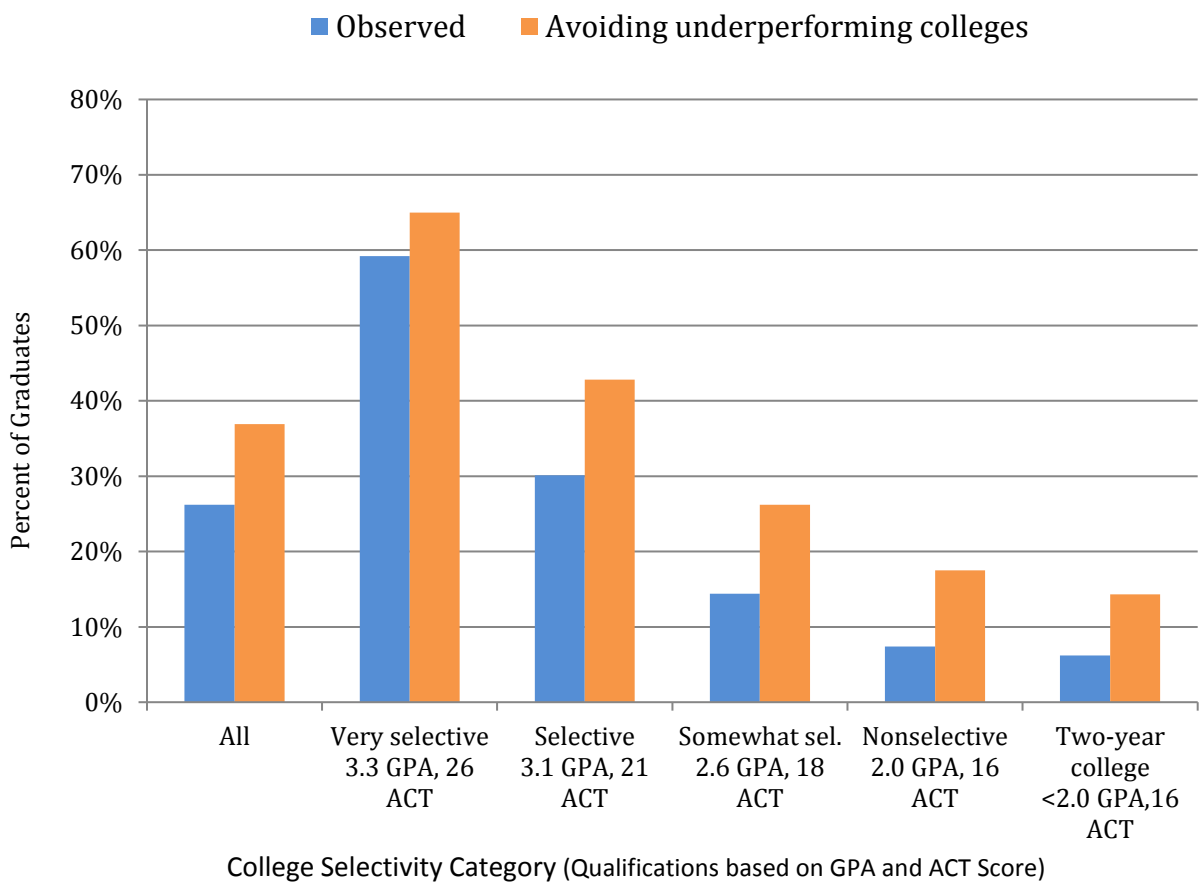
### Simulation 4

Figure 12 illustrates the extent to which college graduation rates would be expected to increase if no students attended a college where they would underperform in terms of graduation rates. For the analyses in this simulation, all students were assumed to attend a college from which they would be expected have

the same chance of graduating that we estimated them having when they graduate from high school. For example, to simulate the effects of not attending an underperforming college, a student with a 20.5 percent probability of graduating from college in four years would be assigned to a college where students graduated at rates between 20 percent and 30 percent.

Sending students to colleges that do not underperform sounds like a sensible and feasible task. However, this may be difficult to achieve in practice, as it would necessitate the breaking of many existing feeder patterns between Chicago high schools and local colleges with very low graduation rates. For example, the two most commonly-attended colleges for CPS students are local public universities that underperform for all groups of students in this analysis.

**Figure 12. Avoiding Underperforming Colleges Could Significantly Improve CPS Students’ College Graduation Rates**



Note: This table includes students who attended a four-year nonproprietary college by the fall immediately following their high school graduation. These numbers are for graduating CPS classes of 2003-09, excluding students from alternative high schools, charter high schools, and some special education programs.

Ensuring that students avoid attending underperforming colleges is expected to improve the overall four-year college graduation rate by 11 percentage points (Figure 12), more than twice the improvement of the earlier presented strategy of ensuring no students undermatch. Unlike the college match simulation discussed earlier, the benefits of avoiding underperforming colleges accrue to students of all qualifications. For students with the qualifications to access very selective colleges, this leads to a 6-point

increase in expected graduation rate. The double-digit increases for students in all other categories underscore the extent of the talent loss possible when students attend colleges that underperform.

Avoiding colleges that lower students' chances of graduating within four years can lead to major improvements in college graduation rates. These improvements are larger than any of the previous simulations for these groups of students. Under this simulation, students with the qualifications to access selective colleges experience a four-year graduation rate increase of 13 points. For students with access to nonselective and two-year colleges, avoiding underperforming colleges is predicted to more than double college graduation rates. Although these simulated graduation rates are still low, they would represent a major improvement in the educational opportunities and outcomes for almost half of Chicago's four-year college-goers.



# Section III: Turning Strategies into Graduates

In this final section of the report, we move beyond looking at the likelihood of earning a degree, and instead reevaluate the strategies previously discussed from a perspective of impact across the district in actual college degrees earned. We also evaluate whether a single strategy or a potential combination of strategies would result in the largest increase in college degree attainment. The previous section outlined the expected increases in four-year degree attainment from increasing GPAs, increasing ACT scores, ensuring all college students attend a “match” college, and ensuring all students avoid attending underperforming colleges. Based on these increases alone, avoiding underperforming colleges and increasing GPAs are estimated to have the greatest overall impact, with both strategies increasing four-year graduation rates between 11 and 12 percentage points. However, because increases in GPAs also increase the number of students who enroll in college, increasing GPA has a compounded effect on college completion. This means, when we look at the *number* of students who graduate from college, increasing GPAs has a clear advantage.

Say for instance, we were to estimate the college completion rates for the 18,838 high school graduates of the class of 2013, the most recent graduating class to have theoretically had enough time lapse since high school graduation to have earned a four-year college degree. Actual college completion rates are not yet available for this cohort, but we can estimate their college outcomes using the college enrollment and completion rates previously obtained from our sample. Based on previous trends, we would expect just 2,187 of that original 18,838 to earn a four-year degree in four years. Implementing a strategy that ensured that no student attends an underperforming college would increase the number of students earning a four-year degree in the allotted time to 2,877: an increase of 690 four-year degrees earned by the 2013 cohort alone. However, if GPAs were to increase by 0.4 grade points, we would expect 3,280 students to earn a four-year degree in the same amount of time. This equates to more than 1,000 additional four-year degrees for the class of 2013 alone (see Table 6).

To better understand why increasing GPA has such a dynamic effect, we need to break down how academic qualifications impact college graduation prospects. As previously outlined, college enrollment and college graduation are not synonymous measures of college attainment. While college enrollment and college completion are indeed separate phenomenon, the sequential nature of college enrollment and college completion means that college completion is dependent on college enrollment. Increasing a student’s match or college choice strategy has no bearing on the likelihood that a student will enroll in college, simply *where* that student chooses to enroll. However, increasing a student’s GPA impacts both their prospects of enrolling in college and graduating from college; thus, the impact of increasing GPA is two-fold. The previous simulations compared increases in GPA and ACT on a subsample of students already enrolled in college. For this subsample, increasing GPA and avoiding underperforming colleges have similar increases on college completion rates (38 percent and 37 percent respectively). However, increasing GPA increases the number of students who go to college, and then also the number of those students who complete college. The compounding effects of increasing GPA on both college enrollment and college graduation are why increases in GPA lead to such remarkable increases in predicted college attainment.

## Different High Schools Benefit from Different Strategies

In Section I, we compared college outcomes between eight different CPS high schools based on differences in GPA and college attendance patterns. These high schools were selected to represent a variety of high schools by type, racial and ethnic composition, and the physical location of the schools within the city. In this next section, we will use five new high schools to compare how the different

strategies presented in this report may translate into gains in actual college degrees. These five schools were chosen based on school composition of academic achievement, and to represent a variety of high schools by type, racial and ethnic composition, and locale. Sullivan High School is a relatively small, racially and ethnically mixed high school, with a mean ACT score below district average. Lane Tech is a very large, ethnically mixed, selective enrollment high school, with a mean ACT substantially above both district and state averages. Kelly High School is also a large, ethnically and racially mixed high school, but unlike Lane Tech, Kelly is not a selective enrollment high school. Composite ACT scores at Kelly are just below the district average. Slightly smaller than Kelly, Kenwood High School is a moderately sized high school with a predominantly Black student population, and a mean composite ACT score about a point above the district average. Merely blocks from Kenwood is Hyde Park Academy, a smaller campus of similar racial composition as Kenwood, but a distinctly different student population based on academic achievement. At Hyde Park Academy the mean ACT score is nearly 3 points under the district average.

Given differences in academic composition it should not be surprising that not all high schools would benefit equally from strategies presented in this report. For instance, at Hyde Park High School and Sullivan High School the benefits of increasing GPAs are clear. At Hyde Park, 126 of the 234 graduates of 2013 had qualifications that placed them in the somewhat selective or nonselective categories, where institutional graduation rates are very low. Only 10 students of the 126 had qualifications that placed them in the very selective access category. For students with qualifications that placed them in the in the lower access categories, increasing GPAs has a stronger impact on degrees earned. Due to the compounding effects of increasing GPAs on college enrollment and college graduation, increasing GPAs by 0.4 points would result in an additional 11 degrees for the class of 2013; an increase of nearly 80 percent. At Sullivan the story is much the same. Only one student of Sullivan's 125 graduating seniors in 2013 had access to very selective colleges. Of the remaining 124 students, 73 students fell into the nonselective or somewhat selective categories. Increasing GPAs by 0.4 points, would result in a doubling of the number of degrees earned by the class of 2013; from 7 to 14. For Hyde Park and Sullivan the answer is clear: focus on GPA.

Due to differences in the distribution of student achievement across high schools, focusing on increasing GPA alone is not always the best strategy. For instance, at Kenwood nearly 20 percent of the graduating seniors in 2013 fell into the very selective category: a group who benefits more from attending a "match" college than increasing GPAs. For Kenwood, a differentiated strategy—one where students in the very selective category are encouraged to attend a "match" college, and all other students receive supports to increase GPAs—would be the most beneficial. By employing a differentiated strategy, Kenwood could see a 50 percent increase in college degree attainment, resulting in 24 additional four-year degrees for the class of 2013. While both Hyde Park and Kenwood's very selective students would see an increase in degree attainment, at Kenwood a differentiated strategy would result in six additional degrees for very selective students compared to just one degree at Hyde Park.

While the distribution of student achievement is important, it is only one component that determines whether a differentiated strategy is more beneficial than an overall increase in GPAs—school size is equally important. As schools get larger, the number of students in each category increases, and small gains in the likelihood of degree attainment can result in larger numbers of degrees earned. For instance, at Lane Tech—where nearly one-half of the graduating class of 2013 fell within the very selective category—a differentiated strategy would result in 43 additional four-year degrees. Lane Tech, like Kenwood, would also experience a 20 percent increase in four-year degree attainment for their very selective students through a differentiated strategy. However, Lane Tech graduated 958 seniors in 2013, with 462 of having qualifications that placed them into the very selective access category. Thus, a 20 percent increase in degree attainment for very selective students at Lane results in seven times the increase in degrees for very selective students at Kenwood.

At the district level, even small increases in college graduation rates can substantially impact the number of four-year degrees earned by CPS graduates. The good news is every strategy presented in this report—increasing ACT scores, increasing GPAs, ensuring college students attend a “match” college, and avoiding underperforming colleges—resulted in a substantial increase in the number of four-year degrees earned by CPS graduates. While all four strategies proved to be potentially beneficial, they are not equally so. Surprisingly, ensuring all students attend a “match” college resulted in the smallest gains in degrees earned (n=495) than any other strategy. Simply avoiding underperforming colleges was far more effective than college match, resulting in nearly 700 more college degrees for the class of 2013. These results reiterate the importance of college choice, and illustrate the effects of variation in college performance within match categories. While increasing ACT resulted in 842 additional degrees, the single strategy with the greatest benefit was clearly increasing GPAs. Increasing cumulative GPA by 0.4 grade points resulted in a 50 percent increase in four-year degree attainment; that’s over 1,000 additional four-year degrees earned for the graduates of 2013 alone. Employing a differentiated strategy—focusing on raising GPAs for the majority of students and ACT scores for the highest qualified students—would add another 130 degrees, with a final increase of 1,223 four-year degrees overall.

**Table 6. Combining Strategies Provides the Greatest Gains in Degree Completion**

|                     | All   | Very Selective | Selective | Somewhat Selective | Nonselective | Two-Year | Strategy Gain |
|---------------------|-------|----------------|-----------|--------------------|--------------|----------|---------------|
| <b>Sample</b>       | 18838 | 2760           | 2595      | 5339               | 3278         | 4866     |               |
| Expected            | 2187  | 1323           | 471       | 316                | 52           | 24       |               |
| Increase GPA by 0.4 | 3280  | 1480           | 905       | 700                | 138          | 57       | 1094          |
| Increase ACT by 2   | 3029  | 1585           | 833       | 507                | 78           | 26       | 842           |
| Match               | 2682  | 1610           | 579       | 417                | 52           | 24       | 495           |
| Underperform        | 2877  | 1453           | 670       | 575                | 124          | 55       | 690           |
| Differentiated      | 3410  | 1610           | 905       | 700                | 138          | 57       | 1223          |
|                     | All   | Very Selective | Selective | Somewhat Selective | Nonselective | Two-Year | Strategy Gain |
| <b>Kenwood</b>      | 344   | 66             | 52        | 98                 | 51           | 77       |               |
| Expected            | 48    | 32             | 9         | 6                  | 1            | 0        |               |
| Increase GPA by 0.4 | 69    | 35             | 18        | 13                 | 2            | 1        | 21            |
| Increase ACT by 2   | 66    | 38             | 17        | 9                  | 1            | 0        | 17            |
| Match               | 59    | 38             | 12        | 8                  | 1            | 0        | 11            |
| Underperform        | 62    | 35             | 13        | 11                 | 2            | 1        | 13            |
| Differentiated      | 72    | 38             | 18        | 13                 | 2            | 1        | 24            |
|                     | All   | Very Selective | Selective | Somewhat Selective | Nonselective | Two-Year | Strategy Gain |
| <b>Hyde Park</b>    | 234   | 10             | 18        | 71                 | 55           | 80       |               |
| Expected            | 14    | 5              | 3         | 4                  | 1            | 0        |               |
| Increase GPA by 0.4 | 24    | 5              | 6         | 9                  | 2            | 1        | 11            |
| Increase ACT by 2   | 20    | 6              | 6         | 7                  | 1            | 0        | 6             |
| Match               | 17    | 6              | 4         | 6                  | 1            | 0        | 3             |
| Underperform        | 21    | 5              | 5         | 8                  | 2            | 1        | 7             |
| Differentiated      | 25    | 6              | 6         | 9                  | 2            | 1        | 11            |
|                     | All   | Very Selective | Selective | Somewhat Selective | Nonselective | Two-Year | Strategy Gain |
| <b>Sullivan</b>     | 125   | 1              | 20        | 39                 | 34           | 31       |               |
| Expected            | 7     | 0              | 4         | 2                  | 1            | 0        |               |
| Increase GPA by 0.4 | 14    | 1              | 7         | 5                  | 1            | 0        | 7             |
| Increase ACT by 2   | 12    | 1              | 6         | 4                  | 1            | 0        | 5             |
| Match               | 9     | 1              | 4         | 3                  | 1            | 0        | 2             |
| Underperform        | 12    | 1              | 5         | 4                  | 1            | 0        | 4             |
| Differentiated      | 14    | 1              | 7         | 5                  | 1            | 0        | 7             |
|                     | All   | Very Selective | Selective | Somewhat Selective | Nonselective | Two-Year | Strategy Gain |
| <b>Kelly</b>        | 509   | 20             | 80        | 152                | 95           | 162      |               |
| Expected            | 35    | 10             | 15        | 9                  | 2            | 1        |               |
| Increase GPA by 0.4 | 64    | 11             | 28        | 20                 | 4            | 2        | 29            |
| Increase ACT by 2   | 55    | 11             | 26        | 14                 | 2            | 1        | 19            |
| Match               | 45    | 12             | 18        | 12                 | 2            | 1        | 10            |
| Underperform        | 53    | 11             | 21        | 16                 | 4            | 2        | 18            |
| Differentiated      | 66    | 11             | 28        | 20                 | 4            | 2        | 31            |
|                     | All   | Very Selective | Selective | Somewhat Selective | Nonselective | Two-Year | Strategy Gain |
| <b>Lane</b>         | 958   | 462            | 230       | 213                | 37           | 16       |               |
| Expected            | 277   | 222            | 42        | 13                 | 1            | 0        |               |
| Increase GPA by 0.4 | 358   | 248            | 80        | 28                 | 2            | 0        | 81            |
| Increase ACT by 2   | 360   | 265            | 74        | 20                 | 1            | 0        | 84            |
| Match               | 338   | 269            | 52        | 17                 | 1            | 0        | 49            |
| Underperform        | 327   | 243            | 59        | 23                 | 1            | 0        | 51            |
| Differentiated      | 375   | 265            | 80        | 28                 | 2            | 0        | 98            |

Note: Degrees attained refers to the predicted number of four-year degrees earned within four years of graduating for students in the high school class of 2013. Estimations are based on the models presented in Appendix D.

Increasing GPA by 0.4 grade points was the single strategy with the biggest gain in degree attainment. However, a differentiated strategy—that combined increases in GPAs for the majority of students and increasing ACT scores for a subset of students—resulted in the greatest gain in degree completion: an additional 1,223 four-year degrees for the class of 2013.

These results clearly indicate the importance of both increasing students' qualifications and college choice. While we have examined each strategy on its own, they are not mutually exclusive, and increasing students' qualifications increases the payoff of college choice. Thus, combining strategies—such as increasing GPA and avoiding underperforming colleges—could potentially result in even larger gains in college degree attainment for CPS graduates. Such a combination could engage educators across grade levels towards a common goal of college graduation—fundamental to an effective college going culture.

# Interpretive Summary

This report is the culmination of a rich body of research on the college outcomes of CPS graduates. The approach has been unique—combining longitudinal qualitative research and large-scale quantitative analysis to dig beyond the upper-most layer of understanding, and reveal unexpected and sometimes troubling findings. While the approach has been multifaceted, the goal has been singular: to provide educators and policymakers with the tools necessary to improve college outcomes for high school students.

A previous report in this series, *Making Hard Work Pay Off*, highlighted the disparities in college enrollment between high-achieving students who graduated from different high schools across the city. These discrepancies largely fell along racial and ethnic lines, with Black and Latino students attending lower-performing colleges than their equally-qualified Asian and White peers. The differences were stark, and the challenge was clear: focusing on college enrollment is not enough to increase college outcomes for CPS graduates as a whole. College match—the approach of enrolling students in colleges that “match” their academic qualifications—posed a promising solution. But college match offers more questions than answers. If college match is the solution to the college completion crisis, then why do similarly-qualified students experience vastly different outcomes at “match” colleges? With so many exceptions to the rule, it became clear that, while college match is a valuable tool, it was likely not the cure-all for college completion.

Improvements in student qualifications over the past decade, have made notable impacts in four-year college access for students. However, despite rising high school graduation rates and climbing academic qualifications, only 18 percent of CPS graduates go on to earn a four-year degree. This report presented simulated effects for four different scenarios aimed at moving the needle on college graduation: 1) Increasing students’ GPAs, 2) increasing students’ ACT scores, 3) improving students’ college match rates, and 4) avoiding underperforming colleges. All four of these tactics demonstrated at least some gains for students; however, improving students’ GPAs and avoiding underperforming colleges produced the greatest gains for the majority of students.

The simulations presented in this report demonstrate the importance of focusing on improving students’ academic qualifications and college choice as strategies to increasing college completion rates. However, from a practice or policy perspective treating, college choice as distinct from academic qualifications defies logic. Indeed, increasing GPA means increasing students’ qualifications, and thus access to better performing colleges, a fundamental component of maximizing college choice. Likewise, given the relationship between GPA and ACT score, interventions aimed at increasing GPAs can be expected to have (at least some) positive impact on ACT scores. Given the results of the previous analysis on college choice, and the reality that college choice is constrained by academic qualifications, it seems only logical to acknowledge the fundamental role that grades play in shaping students’ college outcomes.

Most high school students will have completed somewhere between six and eight semesters of high school coursework before applying to college. Cumulative GPA therefore, is distinct from ACT score (or SAT score), in that it is not a singular assessment of a student’s knowledge, but rather a longitudinal indicator of a student’s experience as a learner. Specifically, cumulative GPA represents a student’s ability to identify and meet the expectations of a variety of educators in a variety of settings. While multiple semesters of high school coursework contribute to cumulative GPA, the importance of ninth-grade year performance is paramount.

Cumulative GPA is a dangerously plastic measure in ninth grade and becomes increasingly rigid as students move through high school. Therefore, increasing academic qualifications is a solution that must be put into play preemptively; before grades are allowed to slip. Furthermore, the tangible payoffs for efforts in high school must be made explicit from day one of ninth grade. As of 2015, about one-third of CPS graduates had qualifications so low that they only had access to two-year and nonselective colleges. Engaging students with conversations about college choice once their qualifications are cast can be discouraging and disempowering. In a way, this research further echoes findings from previous reports in this series, specifically around college-going culture.

Improving students' academic qualifications and college choice are fundamental to meeting the rising bar of education attainment necessary to stay competitive in an increasingly global economy. However, the efforts of high school administrators, teachers, and students are not enough. College choice is a viable solution for immediately increasing college completion rates, but without an equal increase of quality performing colleges to meet the demand of students, the payoffs for increasing college choice are short-lived. The problem of college completion falls equally on the shoulders of high schools and higher education institutions. The demand for quality college slots far exceeds the supply, and low-income students—lacking the buying power of their more affluent counterparts—are often at a distinct disadvantage on the road to college completion.

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# Appendix A: Sample Statistics

**Table A.1. Demographics by College Access Category (2003-09)**

|                            | All<br>n=<br><b>112,096</b> | Very<br>Selective<br>n=<br>9,772 | Selective<br>n=<br>14,162 | Somewhat<br>Selective<br>n=<br>30,573 | Non<br>selective<br>n=<br>21,831 | Two-<br>Year<br>n=<br>35,758 |
|----------------------------|-----------------------------|----------------------------------|---------------------------|---------------------------------------|----------------------------------|------------------------------|
| Cumulative High School GPA | <b>2.23</b>                 | 3.27                             | 3.17                      | 2.60                                  | 2.07                             | 1.38                         |
| ACT Score                  | <b>17.4</b>                 | 25.2                             | 20.13                     | 17.5                                  | 15.5                             | 14.0                         |
| Female                     | <b>56.6%</b>                | 61.8%                            | 66.4%                     | 62.7%                                 | 56.5%                            | 47.2%                        |
| Male                       | <b>43.5%</b>                | 38.2%                            | 33.6%                     | 37.3%                                 | 43.5%                            | 52.8%                        |
| Black                      | <b>47.4%</b>                | 24.0%                            | 35.0%                     | 48.2%                                 | 54.5%                            | 59.8%                        |
| Asian/Pacific Islander     | <b>5.6%</b>                 | 18.1%                            | 10.5%                     | 5.2%                                  | 2.6%                             | 1.8%                         |
| Latino                     | <b>34.8%</b>                | 25.2%                            | 36.1%                     | 35.5%                                 | 35.1%                            | 32.5%                        |
| White                      | <b>12.0%</b>                | 32.7%                            | 18.4                      | 11.1%                                 | 7.7%                             | 5.8%                         |

**Table A.2. GPA by Race/Ethnicity and Gender (2003-09)**

| Percent of Students Within Grade Categories by Race/Ethnicity and gender |       |        |        |        |       |        |                        |        |
|--|-------|--------|--------|--------|-------|--------|------------------------|--------|
|  | Black |        | Latino |        | White |        | Asian/Pacific Islander |        |
|  | Male  | Female | Male   | Female | Male  | Female | Male                   | Female |
| <2   | 57.4% | 36.7%  | 48.8%  | 33%    | 31.3% | 18.7%  | 19.5%                  | 10.6%  |
| 2-2.5  | 22.2% | 24.8%  | 22.2%  | 22.7%  | 20.4% | 16.3%  | 17.1%                  | 11.2%  |
| 2.5-3  | 13%   | 22.7%  | 16.2%  | 21.2%  | 20.6% | 22%    | 23.1%                  | 20.7%  |
| 3-3.5  | 5.9%  | 12.9%  | 9.4%   | 16.4%  | 16.9% | 24.2%  | 24.4%                  | 31.3%  |
| 3.5-4  | 1.5%  | 3.9%   | 3.5%   | 6.7%   | 10.8% | 18.8%  | 15.9%                  | 26.4%  |
|  | 100%  | 101%   | 100%   | 100%   | 100%  | 100%   | 100%                   | 100%   |

**Table A.3. ACT Score by Race/Ethnicity and Gender (2003-09)**

| Percent of Students Within ACT Categories by Race/Ethnicity and Gender |       |        |        |        |       |        |                        |        |
|--|-------|--------|--------|--------|-------|--------|------------------------|--------|
|  | Black |        | Latino |        | White |        | Asian/Pacific Islander |        |
|  | Male  | Female | Male   | Female | Male  | Female | Male                   | Female |
| 14 and lower   | 47%   | 38.8%  | 40.3%  | 36.8%  | 26.5% | 23.8%  | 23.5%                  | 21.4%  |
| 15-17  | 27.6% | 31.1%  | 25.7%  | 29.1%  | 14.2% | 14.1%  | 13.2%                  | 14.6%  |
| 18-20  | 14.9% | 17.8%  | 17.5%  | 18.6%  | 14.9% | 16.5%  | 17.4%                  | 17.7%  |
| 21-23  | 6.7%  | 8.1%   | 9.8%   | 9.8%   | 14%   | 16.2%  | 16.3%                  | 18.1%  |
| 24 and higher  | 3.9%  | 4.2%   | 6.7%   | 5.8%   | 30.4% | 29.3%  | 29.6%                  | 28.2%  |
|  | 100%  | 100%   | 100%   | 100%   | 100%  | 100%   | 100%                   | 100    |

# Appendix B: College Access

**Table B.1. Distribution of College Access by Year (2003-13)**

| Access Category Proportion by Year |       |       |       |       |       |       |       |       |       |       |       |       |       |
|------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                                    | 2003  | 2004  | 2005  | 2006  | 2007  | 2008  | 2009  | 2010  | 2011  | 2012  | 2013  | 2014  | 2015  |
| <b>Two-Year College</b>            | 33.22 | 36.64 | 33.92 | 30.39 | 31.48 | 29.9  | 28.06 | 26.84 | 23.78 | 23.77 | 21.85 | 20.11 | 17.77 |
| <b>Nonselective</b>                | 20.41 | 19.68 | 18.87 | 18.72 | 19.06 | 19.56 | 20.05 | 19.65 | 18.97 | 19.23 | 17.54 | 17.62 | 16.89 |
| <b>Somewhat Selective</b>          | 27.17 | 25.51 | 26.4  | 28.03 | 27.33 | 27.58 | 28.83 | 29.78 | 30.29 | 29.9  | 30.02 | 30.74 | 30.79 |
| <b>Selective</b>                   | 12.45 | 11.72 | 13.02 | 13.63 | 12.73 | 12.57 | 12.37 | 12.4  | 13.58 | 13.43 | 14.57 | 21.76 | 23.61 |
| <b>Very Selective</b>              | 6.75  | 6.45  | 7.79  | 9.23  | 9.4   | 10.4  | 10.7  | 11.33 | 13.37 | 13.67 | 16.02 | 9.77  | 10.96 |
|                                    | 100   | 100   | 100   | 100   | 100   | 100   | 100   | 100   | 100   | 100   | 100   | 100   | 100   |



Analytic sample years

**Table B.2. College Selectivity Access (per Rodrick et al., 2008)**

|                     |             | Unweighted GPA in Core Courses  |                                   |                                   |                                   |                                   |
|---------------------|-------------|---------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
|                     |             | <2.0                            | 2.0–2.4                           | 2.5–2.9                           | 3.0–3.4                           | 3.5–4.0                           |
| Composite ACT Score | Missing ACT | Two-Year Colleges               | Nonselective Four-Year Colleges   | Somewhat Selective Colleges       | Selective Colleges                | Selective Colleges                |
|                     | <18         | Two-Year Colleges               | Nonselective Four-Year Colleges   | Somewhat Selective Colleges       | Somewhat Selective Colleges       | Selective Colleges                |
|                     | 18-20       | Nonselective Four-Year Colleges | Somewhat Selective Colleges       | Somewhat Selective Colleges       | Selective Colleges                | Selective/Very Selective Colleges |
|                     | 21-23       | Somewhat Selective Colleges     | Somewhat Selective Colleges       | Selective Colleges                | Selective/Very Selective Colleges | Selective/Very Selective Colleges |
|                     | 24+         | Somewhat Selective Colleges     | Selective/Very Selective Colleges | Selective/Very Selective Colleges | Very Selective Colleges           | Very Selective Colleges           |

**Note:** Students in the Selective category who are either in an IB program or have taken at least two AP and at least six honors courses are moved up to the Very Selective category.

# Appendix C: College Outcomes

**Table C.1. Percent of All Two-Year and Four-Year College Enrollees Attending a “Match” College by Year and Access Category (2003-13)**

| Year | Total Two-year and Four-year College-Goers | Students with Access to Very Selective Colleges |                         | Students with Access to Selective Colleges |                         | Students with Access to Somewhat Selective Colleges |                         | Students with Access to Nonselective Colleges |                         |
|------|--|---|-------------------------|--|-------------------------|---|-------------------------|---|-------------------------|
|      |  | Percent attending match                         | 2yr & 4yr college-goers | Percent attending match                    | 2yr & 4yr college-goers | Percent attending match                             | 2yr & 4yr college-goers | Percent attending match                       | 2yr & 4yr college-goers |
| 2003 | 8745                                       | 43%   | 980                     | 34%  | 1524                    | 54%   | 3695                    | 53%*  | 2546                    |
| 2004 | 9489                                       | 46%   | 1041                    | 31%  | 1604                    | 49%   | 3941                    | 46%*  | 2903                    |
| 2005 | 9614                                       | 42%   | 1234                    | 32%  | 1729                    | 52%   | 3940                    | 51%*  | 2711                    |
| 2006 | 10142                                      | 43%   | 1419                    | 35%  | 1828                    | 47%   | 4150                    | 49%*  | 2745                    |
| 2007 | 10082                                      | 48%   | 1482                    | 30%  | 1709                    | 50%   | 4116                    | 55%*  | 2775                    |
| 2008 | 10962                                      | 43%   | 1740                    | 29%  | 1791                    | 48%   | 4444                    | 52%*  | 2987                    |
| 2009 | 11976                                      | 42%   | 1812                    | 29%  | 1963                    | 46%   | 4852                    | 49%*  | 3349                    |
| 2010 | 11877                                      | 41%   | 1893                    | 28%  | 1886                    | 44%   | 4881                    | 49%*  | 3217                    |
| 2011 | 12334                                      | 42%   | 2181                    | 26%  | 2071                    | 46%   | 4944                    | 46%*  | 3138                    |
| 2012 | 11077                                      | 42%   | 2025                    | 23%  | 1841                    | 42%   | 4299                    | 40%*  | 2912                    |
| 2013 | 13252                                      | 38%   | 2732                    | 21%  | 2367                    | 40%   | 5081                    | 35%*  | 3072                    |

Note: This figure represents the percent of students within each access category who attended a “match” college. College-goers refers to all CPS graduates from the graduating classes of 2003-13 who enrolled in a two-year or four-year college the fall immediately following graduation (n=119,550). \*Because there is no four-year option available below the nonselective access category, students with access to nonselective colleges are matching (by default) when attending any four-year college. Thus, enrolling in a two-year college would be counted as undermatching for students with access to nonselective colleges.

**Table C.2. Percent of Four-year College Enrollees Attending a “Match” College by Year and Access Category (2003-13)**

| Total Four-year College-Goers | Year | Students with Access to Very Selective Colleges |                   | Students with Access to Selective Colleges |                   | Students with Access to Somewhat Selective Colleges |                   | Students with Access to Nonselective Colleges |                   |
|-------------------------------|------|---|-------------------|--|-------------------|---|-------------------|---|-------------------|
|                               |      | Percent attending match                         | 4yr college-goers | Percent attending match                    | 4yr college-goers | Percent attending match                             | 4yr college-goers | Percent attending match                       | 4yr college-goers |
| 5900                          | 2003 | 45%   | 808               | 39%  | 983               | 74%   | 1563              | 100%*   | 2546              |
| 6202                          | 2004 | 48%   | 821               | 36%  | 989               | 71%   | 1489              | 100%*   | 2903              |
| 6399                          | 2005 | 43%   | 987               | 36%  | 1139              | 74%   | 1562              | 100%*   | 2711              |
| 6727                          | 2006 | 44%   | 1129              | 40%  | 1206              | 67%   | 1647              | 100%*   | 2745              |
| 6977                          | 2007 | 50%   | 1220              | 34%  | 1096              | 68%   | 1886              | 100%*   | 2775              |
| 7547                          | 2008 | 44%   | 1437              | 34%  | 1157              | 68%   | 1966              | 100%*   | 2987              |
| 8308                          | 2009 | 43%   | 1477              | 34%  | 1256              | 66%   | 2123              | 100%*   | 3349              |
| 8367                          | 2010 | 43%   | 1580              | 33%  | 1231              | 65%   | 2085              | 100%*   | 3217              |
| 8403                          | 2011 | 43%   | 1834              | 31%  | 1371              | 68%   | 2196              | 100%*   | 3138              |
| 8069                          | 2012 | 44%   | 1698              | 28%  | 1173              | 66%   | 1691              | 100%*   | 2912              |
| 8709                          | 2013 | 40%   | 2293              | 26%  | 1461              | 68%   | 1883              | 100%*   | 3072              |

Note: This figure represents the number of students from each graduating class within each access category, and the percent of students within each access category who attended a “match” college. Four-year college-goers refers to all CPS graduates from the graduating classes of 2003-13 who enrolled in a four-year college the fall immediately following graduation (n=80,792). \*Because there is no four-year option available below the nonselective access category, students with access to nonselective colleges are matching (by default) when attending any four-year college.

**Table C.3. Percent of CPS Graduates to Earn a Four-Year Degree in Four Years by College Access Category**

|      | College access category | Mean GPA | Mean ACT | Number of CPS Graduates | Percent of Graduating Class | Percent of students to earn 4yr degree in 4 yrs. |
|------|-------------------------|----------|----------|-------------------------|-----------------------------|--|
| 2003 | Very Selective          | 3.4      | 25.9     | 986                     | 6.8%                        | 49.7%  |
|      | Selective               | 3.2      | 20.8     | 1817                    | 12.4%                       | 19.0%  |
|      | Somewhat Selective      | 2.6      | 17.2     | 3965                    | 27.2%                       | 6.9%   |
|      | Nonselective            | 2.1      | 15.3     | 2980                    | 20.4%                       | 2.7%   |
|      | Two-Year                | 1.5      | 13.8     | 4857                    | 33.3%                       | 1.0%   |
| 2004 | Very Selective          | 3.4      | 25.8     | 1054                    | 6.4%                        | 49.4%  |
|      | Selective               | 3.2      | 20.8     | 1916                    | 11.7%                       | 19.1%  |
|      | Somewhat Selective      | 2.6      | 17.4     | 4169                    | 25.4%                       | 7.4%   |
|      | Nonselective            | 2.1      | 15.4     | 3216                    | 19.6%                       | 2.7%   |
|      | Two-Year                | 1.4      | 13.9     | 6034                    | 36.8%                       | 0.9%   |
| 2005 | Very Selective          | 3.3      | 26.1     | 1243                    | 7.7%                        | 50.0%  |
|      | Selective               | 3.1      | 21.2     | 2077                    | 12.9%                       | 19.6%  |
|      | Somewhat Selective      | 2.6      | 17.5     | 4220                    | 26.3%                       | 6.2%   |
|      | Nonselective            | 2.1      | 15.6     | 3027                    | 18.9%                       | 2.8%   |
|      | Two-Year                | 1.4      | 13.9     | 5486                    | 34.2%                       | 0.8%   |
| 2006 | Very Selective          | 3.3      | 25.8     | 1437                    | 9.1%                        | 50.0%  |
|      | Selective               | 3.1      | 21.0     | 2121                    | 13.4%                       | 20.3%  |
|      | Somewhat Selective      | 2.6      | 17.8     | 4377                    | 27.7%                       | 6.4%   |
|      | Nonselective            | 2.0      | 15.7     | 2950                    | 18.7%                       | 2.2%   |
|      | Two-Year                | 1.4      | 14.1     | 4897                    | 31.0%                       | 0.8%   |
| 2007 | Very Selective          | 3.3      | 26.1     | 1497                    | 9.3%                        | 52.6%  |
|      | Selective               | 3.1      | 20.9     | 2025                    | 12.6%                       | 21.5%  |
|      | Somewhat Selective      | 2.6      | 17.7     | 4385                    | 27.2%                       | 8.5%   |
|      | Nonselective            | 2.0      | 15.8     | 3059                    | 19.0%                       | 2.5%   |
|      | Two-Year                | 1.4      | 14.1     | 5134                    | 31.9%                       | 1.3%   |
| 2008 | Very Selective          | 3.3      | 25.8     | 1748                    | 10.3%                       | 51.5%  |
|      | Selective               | 3.1      | 21.0     | 2115                    | 12.4%                       | 19.1%  |
|      | Somewhat Selective      | 2.6      | 17.8     | 4665                    | 27.4%                       | 7.7%   |
|      | Nonselective            | 2.0      | 15.9     | 3317                    | 19.5%                       | 2.4%   |
|      | Two-Year                | 1.4      | 14.3     | 5193                    | 30.5%                       | 1.1%   |
| 2009 | Very Selective          | 3.2      | 26.1     | 1816                    | 10.5%                       | 52.7%  |
|      | Selective               | 3.1      | 20.8     | 2109                    | 12.2%                       | 21.6%  |
|      | Somewhat Selective      | 2.6      | 17.7     | 4926                    | 28.4%                       | 7.1%   |
|      | Nonselective            | 2.1      | 15.8     | 3473                    | 20.0%                       | 2.3%   |
|      | Two-Year                | 1.5      | 14.4     | 5025                    | 29.0%                       | 1.1%   |

Note: This figure represents the four-year college graduation outcomes for all CPS graduates (n=119,550) excluding students who graduated from a charter school or alternative high school, due to lack of comparable grade data. Between the years of 2003 and 2009; 6,234 students are missing college outcome data, which equates to one-half a percent of the sample. Mean ACT and cumulative GPA reflect the mean ACT composite score and mean cumulative GPA upon graduation for each college access category by year.

# Appendix D: Simulation Methodology

Conducting the simulations in this report followed a basic four-step process:

1. Estimate regression models of students' probability of enrolling in and graduating from college.
2. Use the results of those models to calculate predicted probabilities for all students in the appropriate sample.
3. Change the value of one of the following predictor variables: GPA, ACT score, or college random effect.
4. Use the previously estimated model and the newly adjusted data to calculate new, simulated predicted probabilities for each student.

College enrollment and graduation were both modeled using a logistic cross-classified hierarchical linear model, accounting for between-student, between-high school, and between-college differences. Student-level variables included academic qualifications—GPA, ACT score, squared terms for both GPA and ACT score, and a term interacting GPA and ACT score. The model also included indicator variables for students' race and gender, as well as variables representing the concentrated poverty and social status of the student's census block (standing in for student-level measures of socioeconomic status). In addition to student-level variables, the models also included variables indicating whether a student graduated from a vocational or selective enrollment high school. The model for estimating college enrollment includes a random effect for the high school students attend, and the model for estimating college graduating includes a second random effect for the college attended.

## Model

Cross-classified, hierarchical linear models were used to

$$\gamma_{ijk} = \gamma_{000} + \gamma_{001} * College_{ijk} + u_{1j} * College_{r0jk} + \gamma_{002} * MinGrad_{ijk} + \gamma_{100} * GPA_{ijk} + \gamma_{200} * ACT_{ijk} + \gamma_{300} * GPA^2_{ijk} + \gamma_{400} * ACT^2_{ijk} + \gamma_{500} * ACT * GPA_{ijk} + \gamma_{600} * Male_{ijk} + \gamma_{700} * Black_{ijk} + \gamma_{800} * Latino_{ijk} + \gamma_{900} * Asian_{ijk} + \gamma_{1000} * Poverty_{ijk} + \gamma_{1100} * SocCap_{ijk} + \gamma_{1200} * HS_{ijk} + u_{12j} * HS + \gamma_{1300} * Magnet_{ijk} + u_{13j} * Magnet + e_{ijk}$$

In the above model  $\gamma_{ijk}$  represents the predicted probability of student  $i$  in high school  $j$  in college  $k$  earning a four-year degree in four-years given that student's college of attendance, college's minority graduation rate,  $GPA$ ,  $ACT$ , gender, race or ethnicity, neighborhood concentration of poverty, and measure of social connectedness. The model also includes squared terms and interaction term for  $GPA$  and  $ACT$ , in addition to the random student effects, high school effects, and college effects.

## ACT Simulations

To simulate an academic intervention that resulted in an increase in composite ACT score by 2 points, the ACT composite score for all students was increased by 2 points and new predicted probabilities were calculated utilizing students' recalculated ACT.



## GPA Simulation

To simulate the effects of an intervention that resulted in an increase in cumulative GPA by 0.4 grade points, all student's cumulative GPAs were increased by 0.4 grade points and new predicted probabilities were calculated utilizing simulated GPAs.

## College Match Simulation

Simulation three simulated the effects of no student attending an undermatch college the following methodology was employed. Using the match criteria established by previous research,<sup>17</sup> all students in the sample who attended an undermatch college were identified. These students were then randomly assigned to a "match" college, with the randomization being weighted according to the rate of match-student attendance at that college within the original sample. New predicted probabilities for these students were then recalculated based on the new college fixed effects and weighting.

## College Choice Simulation

Simulation four simulated the effects of all student avoiding underperforming colleges. An underperforming college was defined as any college within a student's college choice set that had a graduation rate lower than the student's predicted probability of graduation. A student's college choice set refers to the entire range of colleges that students in the sample, with similar predicted probabilities of graduating, have attended. Simulation four is methodologically similar to simulation three, however instead of substituting college fixed effects for students who undermatched, new fixed effects were substituted for students who attended an underperforming college. Students who attended underperforming colleges were then randomly assigned a new college within their college choice set that had a graduation rate at or above their predicted probability of graduating. Weighting was used once again relative to the college's specific rate of attendance within the subsample for students who did not attend underperforming colleges.

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<sup>17</sup> Roderick et al. (2006).

**Table D.1. Cross-Classified Model Estimating College Enrollment for CPS High School Graduates, 2003-09 (n=112,096)**

|  | Estimate | Standard Error | P Value |
|--|----------|----------------|---------|
| Intercept                                | -12.7613 | 0.1787         | <.0001  |
| ACT Score                                | 0.6735   | 0.0146         | <.0001  |
| Cumulative GPA                           | 2.1872   | 0.0830         | <.0001  |
| ACT-squared                              | -0.0119  | 0.0004         | <.0001  |
| GPA-squared                              | -0.1695  | 0.0155         | <.0001  |
| GPA/ACT Interaction                      | -0.0157  | 0.0033         | <.0001  |
| Female                                   | -0.0055  | 0.0172         | 0.7480  |
| Black                                    | 0.8654   | 0.0347         | <.0001  |
| Asian                                    | 0.3221   | 0.0412         | <.0001  |
| Latino                                   | -0.0409  | 0.0304         | 0.1783  |
| Concentration of Poverty                 | -0.0037  | 0.0131         | 0.7751  |
| Neighborhood Social Status Connectedness | 0.0794   | 0.0126         | <.0001  |
| Selective Enrollment High School         | 0.8863   | 0.0977         | <.0001  |
| Vocational High School                   | -0.0426  | 0.1307         | 0.7449  |

Note: Estimated coefficients are presented in log-odds. The reference group for the model was a student who is White, male, and graduated from a traditional neighborhood high school.

**Table D.2. Cross-Classified Model Estimating College Completion for Four-Year College Enrollees, 2003-09 (n=36,609)**

|  | Estimate | Standard Error | P Value |
|--|----------|----------------|---------|
| Intercept                                | -4.2653  | 0.4619         | <.0001  |
| ACT Score                                | 0.0717   | 0.0315         | 0.0226  |
| Cumulative GPA                           | 0.1163   | 0.2050         | 0.5639  |
| ACT-squared                              | -0.0026  | 0.0007         | 0.0001  |
| GPA-squared                              | 0.0695   | 0.0366         | 0.0591  |
| GPA/ACT Interaction                      | 0.0326   | 0.0071         | <.0001  |
| Female                                   | 0.3434   | 0.0326         | <.0001  |
| Black                                    | -0.3675  | 0.05672        | <.0001  |
| Asian                                    | -0.1363  | 0.0570         | 0.0153  |
| Latino                                   | -0.2403  | 0.0506         | <.0001  |
| Concentration of Poverty                 | -0.0416  | 0.0230         | 0.0706  |
| Neighborhood Social Status Connectedness | 0.0077   | 0.0222         | 0.7233  |
| Selective Enrollment High School         | 0.8024   | 0.1526         | <.0001  |
| Vocational High School                   | 0.0220   | 0.2106         | 0.9168  |

Note: Estimated coefficients are presented in log-odds. The reference group for the model was a student who is White, male, and graduated from a traditional neighborhood high school.

# About the Authors

MELISSA RODERICK, PHD, is the Hermon Dunlap Smith Professor at the School of Social Service Administration at the University of Chicago and a co-director at the UChicago Consortium on School Research. Professor Roderick is also the senior director of the Network for College Success, a network of high schools focused on developing high-quality leadership and student performance in Chicago's high schools. Professor Roderick is an expert in urban school reform, high school reform, high-stakes testing, minority adolescent development, and school transitions. Her new work focuses on understanding the relationship between students' high school careers and preparation, their college selection choices and their postsecondary outcomes through linked quantitative and qualitative research. From 2001 to 2003, Professor Roderick served as Director of Planning and Development for CPS. Professor Roderick has a PhD from the Committee on Public Policy from Harvard University, a master's degree in public policy from the John F. Kennedy School of Government at Harvard University, and an AB from Bowdoin College.

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THOMAS KELLEY-KEMPLE is a Partnering in Education Research Fellow with the Center for Education Policy Research at Harvard University, and doctoral student in the Harvard Graduate School of Education. Previously, Kelley-Kemple served a research analyst with the Postsecondary Transition Project, a sponsored project of the UChicago Consortium on School Research based at the School of Social Service Administration. He received his BA from the University of Chicago in public policy.