ANNENBERG
BROWN UNIVERSITY

EdWorkingPaper No. 19-115

Do Voucher Students Attain Higher Levels of Education? Extended Evidence from the Milwaukee Parental Choice Program

Patrick J. Wolf
University of Arkansas

John F. Witte
University of Arkansas

Brian Kisida
University of Missouri

The Milwaukee Parental Choice Program (MPCP), the first modern private school choice program in the United States, has grown from 341 students attending 7 private schools in 1990 to 27,857 students attending 126 private schools in 2019. The MPCP has been subject to extensive study focused largely on student performance on standardized tests. This study presents new data on the college enrollment, persistence, and graduation of MPCP and MPS students who were tracked over 12 years beginning in 2006. MPCP participants are compared with a matched sample of MPS students who lived in the same neighborhood and had similar demographic characteristics and test scores at the beginning of the study. The collective evidence in this paper indicates that students in the MPCP program have greater educational attainment than the comparison group, as measured by college experience and outcomes. Most of the college attainment benefits of the MPCP are clear for both students who were in ninth grade at the beginning of the study, for whom positive attainment effects have previously been reported, and students who were initially enrolled in grades three through eight, who we examine here for the first time. As of 2018, MPCP students have spent more total years in a four-year college than their MPS peers. The MPCP students in the grade three through eight sample attained college degrees at rates that are statistically significantly higher than their matched MPS peers.

VERSION: August 2019

Wolf, Patrick J., John F. Witte, and Brian Kisida. (2019). Do Voucher Students Attain Higher Levels of Education? Extended Evidence from the Milwaukee Parental Choice Program. (EdWorkingPaper: 19-115). Retrieved from Annenberg Institute at Brown University: http://www.edworkingpapers.com/ai19-115

Do Voucher Students Attain Higher Levels of Education?[1]

This paper is an extension of the ongoing analysis of the first modern school voucher program in America—the Milwaukee Parental Choice Program (MPCP). Specifically, we analyze the effects of that program on the rates at which MPCP students graduate from high school and enroll in, persist in, and graduate from college compared with similar students from the Milwaukee Public Schools (MPS). Most early studies of vouchers and school choice more generally have focused on student achievement, almost always defined as scores on standardized achievement tests. Achievement is an important metric with which to evaluate school choice programs, but we think that educational attainment is at least as central as standardized test scores for the long-term benefits of students.

Studies of school choice programs have increasingly included outcomes other than test scores among their primary analyses. These outcomes include student and parent satisfaction (Campbell 2008; Dee 2005; Howell et al. 2006; Kisida and Wolf 2015; Schneider et al. 1997) as well as societal goals, such as racial integration and reductions in achievement gaps for minority or other historically disadvantaged groups of students (Betts et al. 2006; Bifulco and Ladd 2007; Egalite, Mills, and Wolf 2017; Greene 2005; Neal 2006; Zimmer et al. 2009). Recent work has also considered the impact of transferring to or from an alternative to public school on students' special needs classification (Setren 2019; Wolf and Lasserre-Cortez 2018; Wolf, Witte, and Fleming 2012).

Student attainment levels may be the most consequential outcome for individual students and their surrounding communities over the long term. Students with higher levels of attainment live longer, lead healthier lives, earn more income, and avoid welfare and the criminal justice system at higher rates than their peers with lower levels of attainment (Belfield and Levin 2007; Carneiro, Heckman, and Vytlacil 2003; Day and Newburger 2002; Levitt and Lochner 2001; Lleras-Muney 2005; Muennig 2005; Meara, Richards, and Cutler 2008; Wirt et al. 2004). Most of these studies find positive effects of graduating from high school and going to college even for

[1] We gratefully acknowledge that this update of previous research was funded by the Bill and Susan Oberndorf Foundation, the Walton Family Foundation, the Robertson Foundation, Kate and Bill Duhamel, the Foundation for Excellence in Education, and the Charles and Helen Schwab Foundation. We thank Deven Carlson, Matthew Chingos, Joshua Cowen, and Daniel Kuehn for helpful comments on earlier drafts. This study was commissioned by the Urban Institute as part of a series of reports on the long-term effects of publicly funded private school choice programs. The views expressed are those of the authors and should not be attributed to the Urban Institute or any of our universities, their trustees, or our funders.

students who do not obtain a degree, although degree recipients do demonstrate additional benefits.

School choice studies have correspondingly begun to focus on student attainment, both in terms of high school graduation and exposure to college. Early work in the field showed that students, especially African Americans in urban areas, graduated at much higher rates if they attended Catholic high schools (Coleman and Hoffer 1987; Neal 1997). A large, multistate analysis of public charter schools found large attainment gains for students who moved from traditional public schools to charters (Booker et al. 2011; Zimmer et al. 2009). Another study reported that choice among public schools is associated with modest impacts on the probability of high school graduation (Lauen 2007).

In the school voucher literature, recent studies have uncovered encouraging evidence regarding the effect of participating in private school choice programs on subsequent student educational attainment. An experimental study of the DC Opportunity Scholarship Program for the US Department of Education found that using a voucher increased the likelihood of graduating from high school by 21 percentage points, a 30 percent boost (Wolf et al. 2013). In a similarly rigorous experimental evaluation, Chingos and Peterson (2015) reported that participating in the New York City private-school scholarship program had no significant impact on attainment for the full sample of participants but increased college enrollment rates for students with African American mothers by 6 percentage points, which represented a 14 percent hike in the rate from 42 to 48 percent. The program also increased those students' college graduation rates 5 percentage points, from rates of 7 to 12 percent. In a quasi-experimental analysis employing a student-matching approach similar to the one we use here, Chingos, Monarrez and Kuehn (2019) found that participation in the Florida Tax Credit Scholarship Program increased the average student rate of college enrollment 12 to 19 percent, depending on whether they joined the program in elementary or middle school. They reported that scholarship students obtained a bachelor's degree at rates that were 10 to 20 percent higher than their matched peers from public schools.

Cowen and colleagues (2013) analyzed high school graduation and college enrollment of Milwaukee students who were in eighth or ninth grade at the beginning of the study and college persistence for the ninth grade students. After controlling for a variety of student and parent background factors, MPCP students were 4 to 5 percentage points more likely to graduate from high school and enroll in a four-year college than a matched sample of MPS students. This paper is an extension of that previous MPCP attainment study in terms of both the outcomes studied

and the students for whom those outcomes apply. The approach we take is similar but focuses on college enrollment, persistence, and graduation over a longer period. We track all students in our study for 12 years to 2018.

We find that students in the MPCP program have greater educational attainment than the comparison group. MPCP students are more likely to enroll, persist, and have more total years in a four-year college than their MPS peers. We also find evidence that MPCP students are significantly more likely to graduate from college, although that college completion finding is only statistically significant in our sample of students who entered the program in third through eighth grade.

School Choice in Theory

School choice is a question of who decides. Should individual parents determine which school their child attends, or should attendance be based on the decisions of government officials, specifically the drawing of residential boundaries or "catchment" areas, and the rules for admission to a district-run public school outside of one's area (Witte 2000, pp. 14-15)? It also is a question of who pays. Should public education funds only be spent on government-operated schools, or can a public education be provided by privately-managed public charter schools or even private schools?

Debates about school choice in the United States are as old as the republic itself. The argument in favor of universal parental school choice is grounded in the principles of individual freedom and market efficiency. American revolutionary Thomas Paine (1791) wrote in *The Rights of Man* that parents should have the right to educate their children in whichever kind of school they desired, with the government footing the bill, a concept echoed by libertarian British philosopher John Stuart Mill (1962 [1858]) half a century later.

Opponents of school choice generally ground their position in theories of market failure. Parents are ill-equipped to judge the quality of schools, they claim, so parental choice will not generate the "flight to quality" necessary for participants to benefit from the experience (Smith and Meier 1995). Schools of choice will "cream skim," only admitting the most advantaged and easiest-to-educate students, thus worsening social inequities (Henig 1994; Fiske and Ladd 2000). Also, controlling for the advantaged characteristics of students who choose, student outcomes from private school choice programs will be equal to, or worse than, those from public schools (Lubienski and Lubienski 2014).

Economist Milton Friedman (1955) formulated the first concrete policy proposal for school vouchers. Friedman argued that government should be the funder of K-12 education but need not be its provider. He claimed that a universal system of school choice, funded through government vouchers, would provide a fairer, more effective, and more efficient education to school children. Political scientists John E. Chubb and Terry M. Moe (1990) followed in the wake of these philosophers and economists with *Politics, Markets & America's Schools*, arguing that public school systems are unresponsive bureaucracies by virtue of their political nature. They argued that parental school choice, through vouchers, would be a better system than residence for assigning students to schools and that student achievement would improve with such a transition.

While most of the early debates surrounding the effects of school choice focused on student test scores, more recent arguments and research have included the effects on student educational attainment. Positive theories of choice also propose greater attainment as an outcome of choosing schools. Attainment is a measure of a person's connection to and completion of the educational project. Attainment is captured by a person reaching or failing to reach a series of educational benchmarks including high school graduation as well as college enrollment, persistence, and completion. Students with higher levels of attainment live longer, lead healthier lives, earn more income, and avoid welfare and the criminal justice system at higher rates than their peers with lower levels of attainment (Belfield and Levin 2007; Carneiro, Heckman, and Vytlacil 2003; Day and Newburger 2002; Levitt and Lochner 2000; Lleras-Muney 2005; Muennig 2005; Meara, Richards, and Cutler 2008; Wirt et al. 2004). Most of these studies find positive effects of graduating from high school and going to college even for students who do not obtain a degree, although degree recipients do demonstrate additional benefits.

Private school choice might improve educational attainment. Many parents expect schools to shape positively the character of their children (Zeehandelaar & Winkler, 2013; Stewart & Wolf, 2014; Erickson, 2019). Private schools are voluntary associations of people attracted by a common set of values who can build social capital and a strong sense of community (Coleman & Hoffer, 1987; Hill, Foster, & Gendler, 1990; Brandl, 1998). Most private schools have a religious ethos that provides students with "inspiration and nurture that accomplishes much more that money cannot buy." (Brandl 2006, p. 32). Sustained exposure to a voluntary, religious, and therefore value-intensive, educational environment should increase student levels of personal responsibility and conscientiousness, providing them with the motivation and tools to continue their education. Private schools face competitive pressure to attract and retain students, generating an additional incentive for schools to develop the non-cognitive building blocks to

educational attainment that parental customers desire for their children (Chubb & Moe, 1988; DeAngelis & Erickson, 2018).

Finally, private school choice programs might positively affect student educational attainment because they tend to draw disadvantaged, inner-city students out of neighborhoods that otherwise would tempt them to give up on their education and, instead, surround them with a school culture and peers that expects them to choose education as their long-term path to success (Akerlof and Kranton, 2002; DeAngelis and Dills 2018). For all these reasons, we hypothesize that the Milwaukee Parental Choice Program will have a positive effect on long-term measures of student educational attainment.

The Milwaukee Parental Choice Program

The first modern private-school voucher program in the United States began in 1990 in Milwaukee, Wisconsin.[1] In the second half of the 20th century, the student population in MPS followed a path similar to many other large-city districts in America. In 1967, the district was over 70 percent white; 30 years later, before the establishment of the MPCP, the numbers were 18 percent white, 62 percent African American, 13 percent nonwhite Hispanic, and 7 percent other races (Witte 2000, 37).

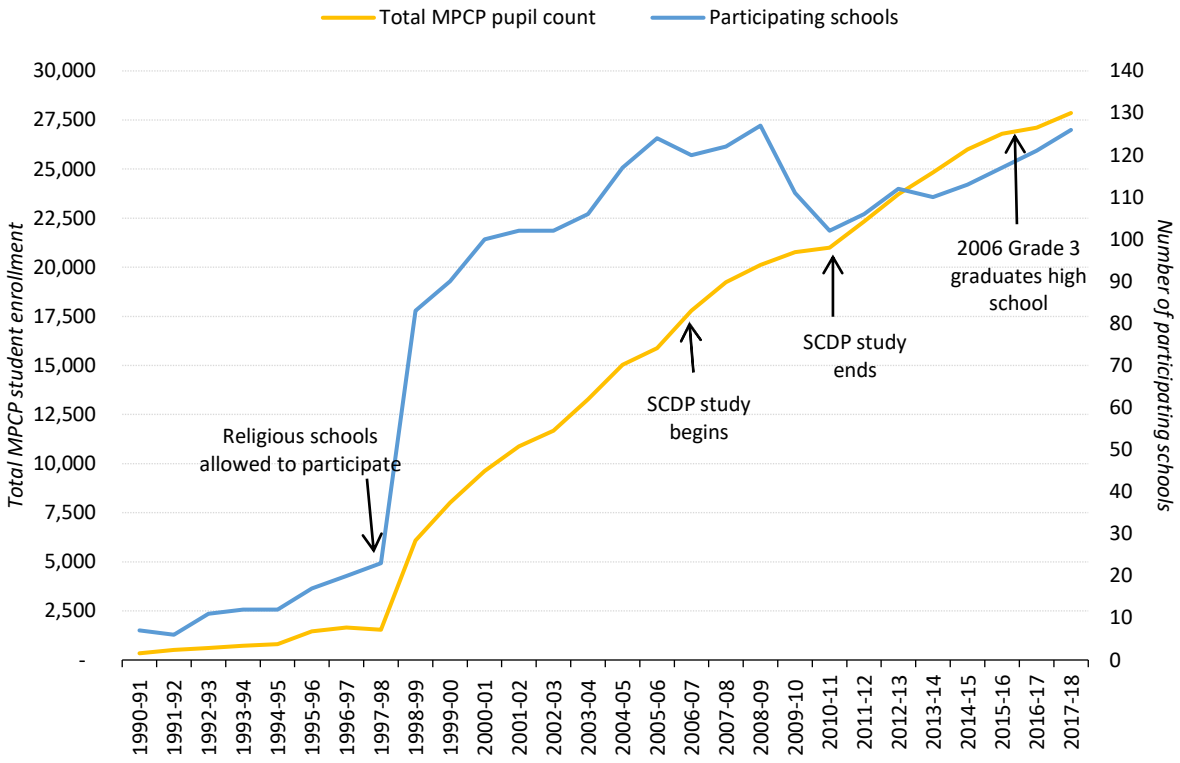
The Milwaukee Parental Choice Program (MPCP) began in the fall of 1990 as a five-year pilot school voucher initiative with seven private schools and 341 students. It was a highly constrained and targeted program, with eligible students limited to Milwaukee residents with incomes at or below 175 percent of the federal poverty level. Participants had to have been in an MPS school in the previous year or entering kindergarten. Program participation was capped at 1 percent of the MPS enrollment (approximately 1,000 students). Most importantly, the private schools had to be secular and could not enroll more than 49 percent of their students through the voucher program. The maximum voucher amount was $2,446. Thus, the program was small, constrained in many ways, and only open to a minute portion of Milwaukee private schools, over 80 percent of which were religious at that time (Witte 2000, 44–6).

Over the next 25 years, the voucher program in Milwaukee grew substantially in terms of programs, policy changes, costs, and the numbers of schools and students participating (figure 1). A major legislative change to allow entry of religious schools occurred in 1996, approved by the Wisconsin Supreme Court in 1998 and further supported by the 2002 US Supreme Court *Zelman v. Simmons-Harris* ruling that school voucher programs do not violate the US Constitution under

certain conditions that are common to such programs.[2] That change led to major increases in total students and in participating private schools that they could attend.

FIGURE 1

Students and Schools Participating in the MPCP, 1990–91 through 2017–18



Source: Data obtained from Wisconsin Department of Public Instruction regarding the "Third-Friday in September" Enrollment Count.
Note: SCDP = School Choice Demonstration Project.

From the 1998–99 to the 2008–09 school year, student enrollments in the MPCP grew steadily each year while the number of participating schools increased very slightly. The average number of MPCP students per participating school was 73 in 1998–99; it had more than doubled to 158 by 2008–09. During this period, public pressure to exclude private schools that were perceived to be of low quality led to program changes, such as the requirement that all MPCP schools be accredited (Public Policy Forum 2008).

Throughout the program's history, the voucher has had to be accepted as the full cost of educating the child in their chosen private school. The maximum value of the voucher was held to a narrow range of $6,442 to $6,607 from 2006–07 to 2010–11, a period in which per-pupil funding of MPS students increased from $12,044 to $14,863 (Wolf 2012). Unsurprisingly, the

number of private schools participating in the MPCP dropped during the Great Recession, from 127 in 2008–09 to 102 in 2010–11, even while student enrollments in the program continued to increase, pushing the ratio of voucher students to voucher schools up to 206:1.

New policies adopted in 2013 allowed the voucher maximum value to increase at the annual rate of increase in K–12 public school spending in the state and provided slightly more voucher money for students in high school. More private schools joined the program, but so did more students. By the 2017–18 school year, 27,857 students were being educated in 126 participating private schools through the MPCP, an average of 221 voucher students per school.[3]

The MPCP is by far the largest, oldest, and most controversial of the four private-school voucher programs in the Badger State.[4] It also provides the best opportunity for continued research. Initial evaluations of the MPCP five-year pilot program remain a major component of the literature on voucher impacts, whether from the state's official evaluator (summarized in Witte 2000) or analyses by outside scholars (Greene, Peterson, and Du 1999; Rouse 1998). In 2005, the program was reauthorized and expanded to a maximum of 22,500 students (2005 Wisconsin Act 125). The reauthorization also began a new evaluation by the School Choice Demonstration Project at the University of Arkansas, starting in 2006, the first student-level evaluation of the program since its post-pilot expansion in 1996 (figure 1).

Multiple reports, published articles, and dissertations have emerged from the second evaluation that began with baseline data collected on a sample of MPCP students in grades three through nine in 2006 (e.g., Carlson, Cowen, and Fleming 2013; Cowen et al. 2012; Cowen et al. 2013; DeAngelis and Wolf 2019; Egalite et al. 2014; Fleming 2009; Fleming et al. 2015; McShane 2013; Witte et al. 2008; Witte et al. 2014; Wolf 2012; Wolf, Witte, and Fleming 2012). The evaluation data covered the outcome years of 2007–08 to 2010–11, a period of consolidation of more MPCP students into fewer MPCP schools. The range of outcomes studied was considerable, including behavioral and attitudinal comparisons based on extensive annual surveys of parents and students, school case studies, parental focus groups, student results on standardized achievement effects, and attainment, defined as graduation from high school and initial enrollment and persistence in college. We focus in this report on attainment but we briefly describe the achievement results from the previous study.

The evaluation originally was focused primarily on student achievement gains because of legislative interest and requirements. That legislation required the evaluators to track the progress of a "representative" panel of new and continuing MPCP students against a panel of

"comparable" MPS students over five years (2005 Wisconsin Act 125). No statutory provision was made to allow the evaluators to conduct a randomized lottery for research purposes. Generally, the evaluation found few differences in math or reading growth between the MPCP students and their matched MPS peers from 2007 to 2009. The 2010 data, however, indicated that MPCP students gained significantly in reading achievement compared with their matched MPS peers, at least in part because a separate high-stakes testing provision was added to the MPCP authorization in 2009 (Witte et al. 2014).

The three of us, along with Joshua Cowen and David Fleming, extended the scope of the MPCP evaluation to include initial data on attainment in the form of high school graduation and postsecondary enrollment primarily for the ninth graders and secondarily for the eighth graders in our sample in 2006. Cowen and colleagues (2013) found that enrollment in the MPCP in ninth grade was associated with significantly higher rates of high school graduation, four-year college enrollment, and persistence into the second year of college. Our analysis here adds more years of attainment data to that original ninth-grade sample and examines data on students enrolled in grades three through eight in 2006 as a second, larger analytic sample.

General Research Strategy

Since few participating private schools admitted students by lottery, our evaluation is quasi-experimental, relying on matched samples of students who were enrolled in the MPCP and MPS in the fall of 2006.

Creating the Matched Samples

Due to resource constraints we could not include every MPCP student in the study. The research was based on a random sample of 1,926 students in the MPCP in grades three through eight. We added all 801 ninth grade MPCP students to this representative sample of elementary school students. We followed all the MPCP ninth-graders, instead of a random sample, because MPCP program enrollments were much lower in the high school grades and we knew that ninth-graders in 2006 were scheduled to graduate high school (or not) and perhaps enroll in college within the five-year timeline of our initial study. The total sample of MPCP students numbered 2,727.

Since the MPCP had been operating for 16 years when we started our study, 70 percent of the students in our representative sample were continuing in the program and not newly entering it. These continuing students already had some exposure to the MPCP before our evaluation. Thus, our study is of the effect of being in the MPCP in 2006, regardless of whether it was the student's 1st or 10th year in the program. Since the MPCP students had varying amounts of prior

participation in the program, it was especially important to match them carefully to similar students who were enrolled instead in MPS.

We used a three-part strategy to select a comparison group that combined exact, test-band, and propensity score matching (Witte et al. 2008). We began with a unique step of exactly matching each MPCP student to a set of MPS students in their grade and residing in their same neighborhood, narrowly defined by census tract. Milwaukee has 213 census tracts, drawn deliberately to follow the contours of actual neighborhoods. This approach is important because the underlying problem in behavioral studies is the effect of unmeasured selection bias. Neighborhood effects capture some of this unmeasured bias (Bifulco 2012), as people who live in the same neighborhood tend to share similar characteristics including their value of education and aspirations for their children (Aaronson 1998; Cullen, Jacob, and Leavitt 2005).

Because we were concerned with sets of students beginning with widely disparate initial levels of educational achievement, from within the set of MPS students exactly matched by grade and neighborhood, we further matched MPCP students to MPS peers who were within a narrow test-score band of 5 percent of the student baseline achievement distribution. In some cases, these requirements reduced the list of potential MPS student matches to only one student and the matching for those students ended.

In most cases, there remained multiple possible MPS matches for each MPCP student. We used propensity score analysis to order the remaining set of MPS comparison students (Rosenbaum and Rubin 1983). The propensity analysis included initial test scores (again) and a series of student demographic variables including race, gender, and English language status. The student with the closest propensity score to the MPCP student then was selected as the match.

We limited the propensity score model to reliable variables in the MPCP and MPS student enrollment databases. We did not match students based on their participation in the free and reduced-price lunch program since many private schools do not participate in that government initiative even if their students are poor. We did not match on mother's level of education because we were only able to obtain that information from a portion of the sample post-match.

Tables 1 and 2 provide descriptive statistics of student race, gender, and 2006 math and reading scores for both our ninth-grade and third-through-eighth-grade attainment samples of MPCP and matched MPS students. Table 1 also provides information about parental education, income, religion, and family structure for the original attainment sample of ninth-graders in MPCP and MPS in 2006 that were obtained from study participants through surveys

administered after the match. The survey response rate was 68 percent, but some respondents left specific survey items blank. Complete data were obtained from 54 percent of respondents. All differences are weighted to account for survey nonresponse.

TABLE 1

MPCP and MPS Ninth-Grade Sample Baseline Statistics

	MPS	MPCP	Difference
African American	0.72	0.72	0.01
Hispanic	0.16	0.17	0.01
Asian	0.04	0.03	0.00
White	0.07	0.07	-0.01
Female	0.53	0.59	0.06***
Complete *N* = 1,602			
2006 math score	0.06	-0.01	-0.07
2006 reading score	0.07	0.24	0.17***
Complete *N* = 1,318			
Income >$50K	0.17	0.04	-0.13***
Income $35–50K	0.16	0.14	-0.02
Income $25–35K	0.15	0.22	0.07***
Income <$25K	0.52	0.60	0.08**
Both parents in home	0.34	0.37	0.03
Parent high school dropout	0.23	0.21	-0.02
Parent high school graduate	0.30	0.27	-0.03
Parent some college	0.33	0.37	0.03
Parent college graduate	0.14	0.16	0.02
Frequency of religious attendance	0.53	0.65	0.12**
Complete *N* = 863			

Source: Authors' computation from 2006 baseline database.
Notes: MPCP students are the population of all MPCP students who were in ninth grade in September 2006. MPS students are a matched sample. All cells are proportions except math and reading, which are standardized against MPS population means. Survey data on both parents, income, parental education and religious attendance administered in spring 2007. "Complete *N*" indicates the number of observations with complete data on all variables listed above that row.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Matching approaches rarely produce study samples that are exactly equal in all relevant respects. Since we prioritized student grade level and neighborhood, exactly matching on those critical features, there was a chance that the groups would differ systematically on some of the other measurable factors. As table 1 indicates, the ninth-grade match resulted in similar proportions of students of various ethnicities in the MPCP and MPS samples. The proportion of female students was 6 percentage points higher in the MPCP than the MPS sample.

Average baseline math test scores were similar for the two groups, but average baseline reading scores were higher for the MPCP students. Average income was higher for MPS students, which reflects the heavily means-tested nature of the MPCP program at that time; fewer

MPCP students came from families with income more than $50,000 annually and more came from families with less than $25,000 annually. Students in both groups were equally likely to have a parent with a college degree and to have both parents in their homes—crucial factors when studying educational attainment. MPCP students in the ninth-grade sample were 12 percentage points more likely to have parents who attended religious services at least weekly.

Table 2 provides similar evidence regarding the larger sample of students in grades three through eight. Survey data on family background factors for this group were less complete than for the ninth-grade sample and therefore are not presented here or used in the analysis. The proportions of African American, Asian, white, and female students were similar across the two groups. There were 3 percentage points more Hispanic students in the MPCP than in the MPS sample.

Average reading test scores were similar across the two groups but average math scores were higher for the MPS comparison sample. This test-score difference was driven by the group averages in grades three through five exclusively. Although the MPS students were matched to the MPCP students within a narrow test-score band, in those lower grades the MPS matched students tended to be near the top of that range in math.

TABLE 2

MPCP and MPS Third-through-Eighth-Grade Sample Baseline Statistics

	MPS	MPCP	Difference
African American	0.65	0.64	-0.01
Hispanic	0.21	0.24	0.03**
Asian	0.03	0.02	-0.01
White	0.07	0.08	0.01
Female	0.54	0.53	-0.01
2006 math score	-0.13	-0.26	-0.14***
2006 reading score	-0.14	-0.14	0.00
Complete *N* = 3,852			

Source: Author's computation from 2006 baseline database.
Notes: MPCP students are the population of all MPCP students who were in ninth grade in September 2006. MPS students are matched sample. All cells are proportions except math and reading, which are standardized against MPS population means. "Complete *N*" indicates the number of observations with complete data on all variables listed above that row.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Estimating Attainment Differences

We use probit models to measure the impact of MPCP participation on educational attainment, specified separately as high school completion, ever enrolled in college, enrolled at least one year

in college, and graduated from college. We also examine total years in college as an outcome using OLS regression. We run separate models for two- and four-year college outcomes as well as a combined measure of any college enrollment regardless of type.

We present results that control for student race and gender, as well as baseline (2006) student test scores, which differed for the MPCP and MPS students in some of the samples. In models for the ninth-grade sample only, we also include a set of controls for parent characteristics, most crucially survey indicators of parental education levels, as well as income and religious behavior. We cluster our standard errors by students' census tract since unmodeled variation in student attainment rates is likely correlated for students living in the same neighborhood.[5]

We use descriptions of four levels of statistical significance to characterize the confidence we have that our findings are not the result of random factors. Differences between the MPCP and MPS students that we describe as "not statistically significant" could easily be because of chance and therefore should not be attributed to the voucher program. Those nonsignificant results appear without any asterisk in our tables and figures. Results are described as "marginally statistically significant" if they are significant at the 90 percent confidence level (* in the figures and tables), "statistically significant" at the 95 percent level (**), and "highly statistically significant" at the 99 percent level (***).

We chose not to combine the ninth-grade and third-through-eighth-grade samples for two reasons. First, we had more complete data for students in our ninth-grade sample, especially from the parent survey administered after the match. If we had combined the samples, we would not have been able to include control variables for parent characteristics without losing over half of the observations in the sample because of missing data. Since our most complete and rigorous model could only be estimated on the ninth-grade sample, we kept that sample separate from the larger third-through-eighth-grade sample.

Second, the experience of the MPCP may have been different for the voucher students in the two samples. For the ninth-graders we knew that they had experienced at least one year in a private high school. For the third-through-eighth-graders we only knew for sure that they had experienced at least one year in a private elementary school. Private schooling may have a different effect on attainment if experienced in high school versus elementary school. Coupled with the differences in data on control variables, this circumstance gave us convincing reasons to analyze the two samples separately.

We obtained data on student college enrollments from the Student Tracker service of the National Student Clearinghouse. The Clearinghouse consolidates the information about college enrollments, persistence, and graduation from almost every two- and four-year institution of higher education in the US, covering over 98 percent of all college students. We received data from the Clearinghouse on April 16, 2019. Those data reflect the college-going status of students at least through December of 2018.

A ninth-grade student in our sample who graduated from high school on time, immediately enrolled in a four-year college, and graduated from college on time would have graduated by June of 2014. That means that our ninth-grade cohort was checked for on-time college graduation plus an extra four years. The eighth-grade cohort was covered for on-time college graduation plus three years, the seventh-graders for on-time plus two years, the sixth-graders for on-time plus one year, the fifth-graders for on-time, the fourth-graders for on-time minus one year, and the third-graders for on-time minus two years. The attainment measure of "ever graduated from a four-year college" is thus much more appropriate for our ninth-grade cohort, who had eight years to enroll in and complete college, than for our third-through-eighth-grade sample, many of whom would not have had the opportunity to graduate from college on time within the time parameters of our study. For that reason, we exclude the third and fourth grade students from the sample specifically when analyzing four-year college graduation rates, making that sample effectively fifth-through-eighth grade.

We only have limited data on the number of years that students who were in MPCP at baseline attended private schools in subsequent years, but the available information suggests divergent patterns by grade level. Forty-four percent of the ninth-grade sample of MPCP students remained in the voucher program for the next four years (Cowen et al. 2013) compared with 55 percent of students who began the study in grades three through five (Cowen et al. 2012). The persistence rate of the baseline sixth-through-eighth-grade students was between the lower rate of the ninth-grade students and the higher rate of the third-through-fifth grade students. Since 70 percent of the students in the study had participated in the voucher program prior to 2006, it is reasonable to conclude that most of them experienced a moderate "dose" of the school voucher intervention of three to six years total. Although our data are not precise on this question, they suggest that most MPCP students experienced private schooling for more than one year but not for the majority of their years in K–12 schools.

Results

We begin by extending the findings for the 2006 ninth-grade students (Cowen et al. 2013). We present the results for the effect of MPCP student enrollment on the probability of ever enrolling in any type of college, the probability of ever enrolling in a two-year or four-year college, the probability of graduating from college, and the total amount of time spent in college. The appendix tables contain information on the effect of MPCP student enrollment on all nine of our measures of attainment, including high school graduation. The results across all measures are similar to the results for the four specific measures we highlight in the discussion below.

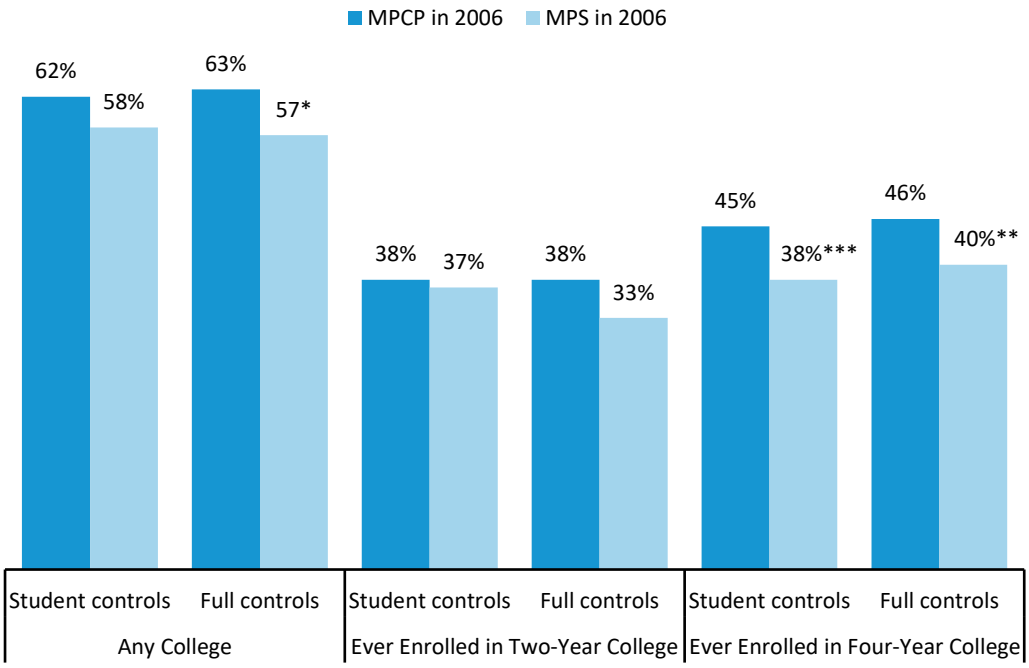
Ninth-grade students who participated in the MPCP in 2006 were more likely to enroll in any type of college by 2017 than were their matched MPS peers (figure 2). The difference of 4 percentage points (62 percent versus 58 percent) in the statistical model with only student controls was not statistically significant. The larger difference of 6 percentage points (63 percent versus 57 percent) in the statistical model with both student and parent controls was marginally statistically significant.

The effects of MPCP participation appear to be different for enrollment in two-year versus four-year colleges (figure 2). The baseline ninth-grade MPCP and MPS students ever attended two-year colleges at nearly equal rates of 37 and 38 percent, controlling for student background. The MPCP students held a 5 percentage point advantage over the MPS students in the likelihood of two-year college enrollment once parent controls were added, but that difference was not statistically significant.

We find stronger evidence that MPCP students in our ninth-grade sample enrolled in four-year colleges at higher rates than their matched MPS peers. Controlling for student background, the MPCP rate of ever enrolling in a four-year institution was 45 percent compared with 38 percent for MPS. The MPCP advantage of 7 percentage points in the probability of ever attending a four-year college or university was statistically significant. After parent controls were added to the model, the MPCP advantage in the probability of enrolling in a four-year institution dropped to 6 percentage points but remained statistically significant.

FIGURE 2

Effect of MPCP Participation on College Enrollment, Ninth Grade at Baseline



Notes: Regression estimates with student controls (N = 1,289) include student race, gender, and baseline reading and math scores; estimates with full controls (N = 863) add parent education, parent income, and parent religiosity. Robust standard errors are clustered by census tract. Estimates are marginal effects from probit estimations.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

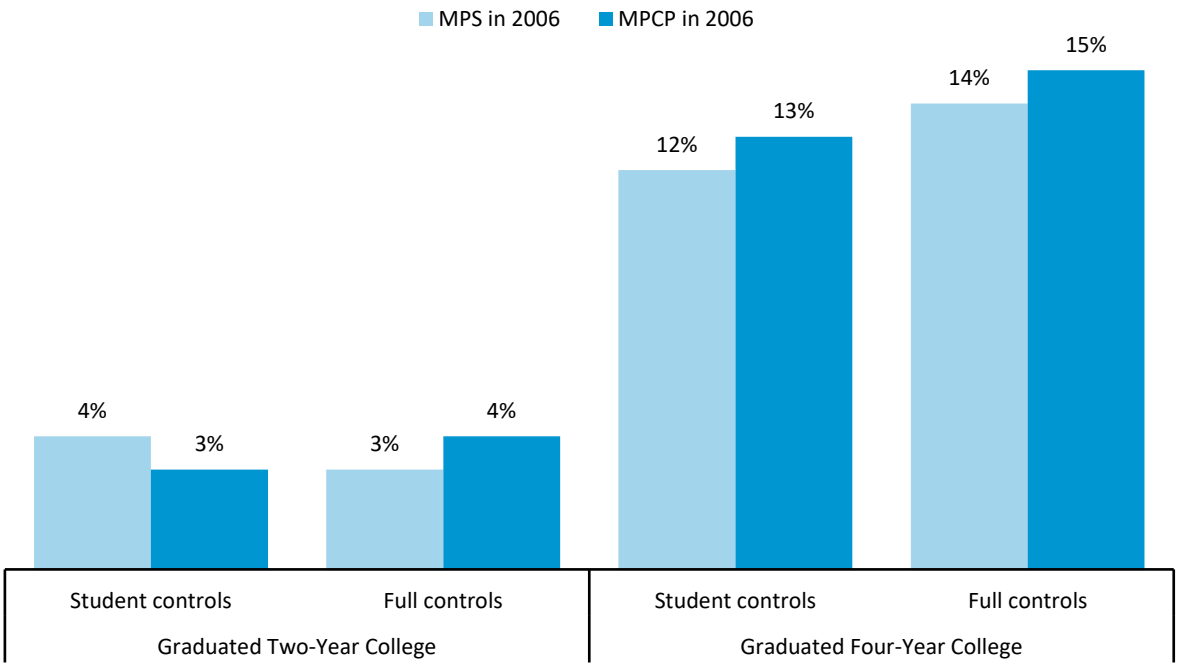
The evidence continues to be stronger for an MPCP effect on attainment in four-year institutions of higher education than two-year institutions, when total time at the institution is the attainment measure (tables A.1–A.3). The Milwaukee students obtained an average of about three-quarters of a year of education at two-year colleges, whether they were MPCP or MPS ninth-graders in 2006 and whether we controlled for only student background or both student and parent background. Controlling for student background, the MPCP students completed an average of 1.40 years in a four-year college or university compared with 1.20 years for their matched MPS peers. The gain of an extra 20 percent of a year in four-year college attainment for the MPCP students was statistically significant. Once parent controls were added to the model, however, the MPCP advantage in time completed at a four-year college dropped to an extra 15 percent of a year and became not statistically significant.

The ultimate attainment prize is college graduation. Low-income inner-city students traditionally struggle to complete college degrees (Bound, Lovenheim, and Turner 2012). Our results indicate that struggle continued for the Milwaukee 2006 ninth-graders in our study. By

2018, the students had obtained two-year degrees at rates of 3–4 percent whether they were enrolled in MPCP or MPS and whether we controlled for only student or both student and parent background factors (figure 3). The estimated graduation rate from a four-year college was 14–15 percent for the MPCP students and a statistically similar 13–14 percent for their matched MPS peers, depending on the statistical model.

FIGURE 3

Effect of MPCP Participation on Degree Attainment, Ninth Grade at Baseline



Notes: Regression estimates with student controls (N = 1,289) include student race, gender, and baseline reading and math scores; estimates with full controls (N = 863) add parent education, parent income, and parent religiosity. Robust standard errors are clustered by census tract. Estimates are marginal effects from probit estimations.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

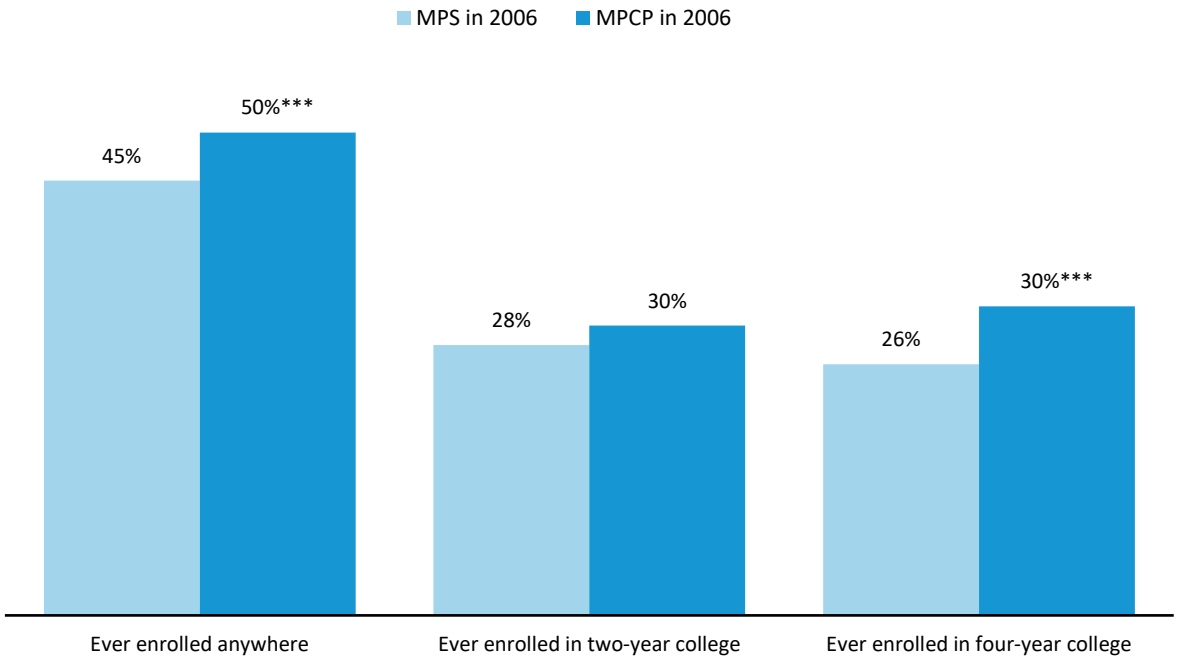
What about our sample of students in third through eighth grade in 2006? Does that group generate clearer attainment results of the MPCP because of their larger sample size or less clear effects because we can only be sure that they attended private schools of choice in the elementary grades? We see a similar pattern of attainment effects for the younger sample of students in 2006 as we observed for the ninth-graders, with the exception that the MPCP students from elementary grades are also graduating college at higher rates. All of the results we present here for the sample of students in grades three through eight in 2006 are based on statistical models that

include student controls for gender, race, income, English language learner status, and 2006 test scores.

Students enrolled in the MPCP in grades three through eight in 2006 were 5 percentage points more likely than their matched MPS peers to enroll in any type of college by 2017 (50 percent versus 45 percent). The higher college enrollment rate for the MPCP students was highly statistically significant (figure 4). The MPCP enrollment advantage for the younger sample of students is only clear regarding four-year colleges. MPCP students enrolled in two-year colleges at a rate that was 2 percentage points higher than their MPS peers (30 percent versus 28 percent), but that difference was not statistically significant. The younger sample of MPCP students enrolled in four-year colleges at a rate that was 4 percentage points higher than their MPS peers (30 percent versus 26 percent) and that difference was highly statistically significant.

FIGURE 4

Effect of MPCP Participation on College Enrollment, Third through Eighth Grades at Baseline



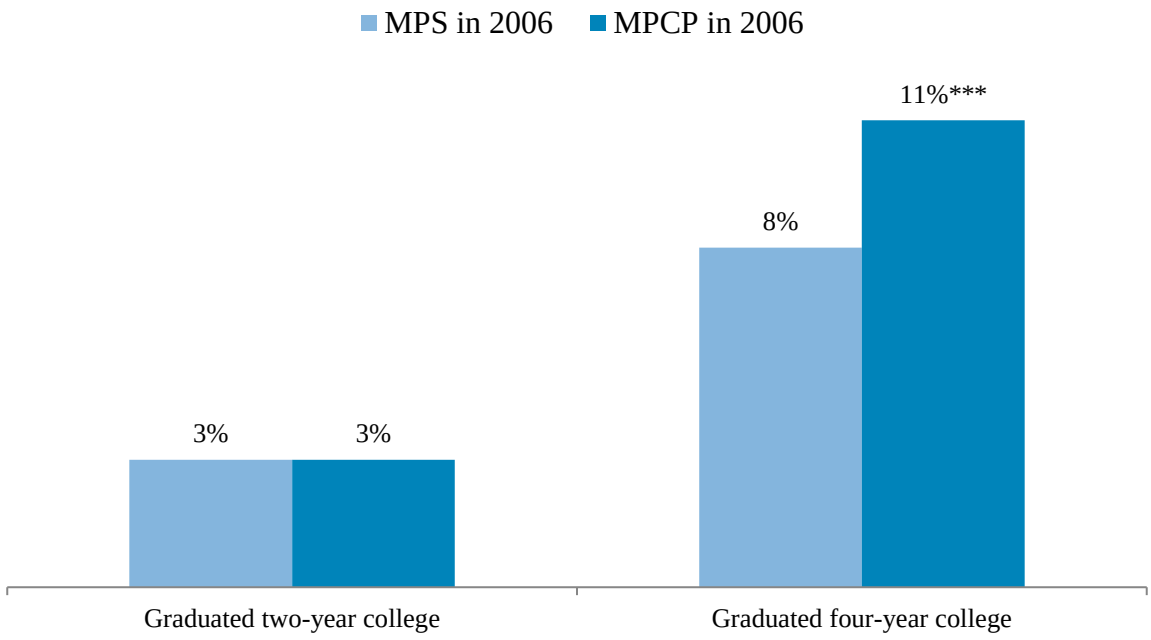
URBAN INSTITUTE

Notes: N = 3,682. Regression estimates include student race, gender, and baseline reading and math scores. Robust standard errors are clustered by census tract. Estimates are marginal effects from probit estimations.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

A similar pattern is apparent regarding the years of college completed by MPCP and MPS students in our 2006 third-through-eighth-grade sample (tables A.4 and A.5). By 2018, both groups had averaged about slightly more than half a year at a two-year college. The MPCP students, however, averaged 15 percent of a year more time at a four-year college than the matched MPS students (0.94 of a year versus 0.79 of a year), another attainment advantage for the voucher students that was highly statistically significant.

FIGURE 5

Effect of MPCP Participation on Degree Attainment, Third through Eighth Grades at Baseline



Notes: *N* = 3,682; 2,422 for four-year graduation. Regression estimates include student race, gender, and baseline reading and math scores. Robust standard errors are clustered by census tract. Graduation from four-year college limited to students in fifth grade and up in 2006–07.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Finally, in contrast to our ninth-grade sample, we see clear evidence that students who were in grades three through eight in 2006 are graduating from college at higher rates if they were in the MPCP (figure 5). Only 3 percent of both the MPCP and MPS groups had graduated from a two-year college by 2018. The MPCP students in grades five through eight in 2006, and therefore old enough to have graduated from four-year colleges by 2018, did so at a rate that was 3 percentage points higher than their MPS peers (11 percent versus 8 percent). That difference

was statistically significant. One reason for the lower graduation rates of the third-through-eighth-grade sample compared with the ninth-grade sample is that the younger students had less extra time to graduate from a four-year college when we collected our outcome data.

Conclusions

These findings regarding the attainment effects of the Milwaukee Parental Choice Program are from a quasi-experimental study that matched a representative sample of MPCP students who were enrolled in the voucher program in 2006 with a similar group of students enrolled in Milwaukee Public Schools that same year. There are three reasons to think these effects were caused by the voucher program. First, we matched students on neighborhood, an approach viewed as state-of-the-art in quasi-experimental matching studies (Bifilco 2012) because families who live in the same neighborhood tend to share similar traits, including their value of education and educational aspirations for their children (Aaronson 1998; Cullen, Jacob, and Leavitt 2005). Second, for our sample of 2006 ninth-grade students, both the MPCP and MPS students were statistically similar regarding key parent characteristics, such as parent educational attainment and the proportion who had two parents living in the home, even though those two variables were not available for the match. Third, the statistically significant differences we observed between the MPCP and MPS groups were highly consistent for most attainment outcomes regardless of whether we controlled for no variables, only student background factors, or both student and parent variables, suggesting that uncorrected self-selection bias is not driving our findings.

The collective evidence in this paper indicates that students in the Milwaukee Parental Choice Program tend to have higher levels of educational attainment than a carefully matched comparison group of Milwaukee Public School students. That finding generally applies to the original ninth-grade sample of students and a new sample of students enrolled in the program in grades three through eight in 2006. The MPCP students are more likely to enroll, persist, and experience more total years in a four-year college. Although both of our samples of students graduated from a four-year college at slightly higher rates if they participated in the MPCP as opposed to the MPS in 2006, those differences were only statistically significant for the larger sample of students who were enrolled in the program in grades five through eight.

For all students in either group, both two- and four-year college graduation rates are very low. The highest estimated rate for four-year graduation for any student subgroup is 15 percent. This low completion rate is symptomatic of many inner-city high school graduates who go on to

college. Colleges and universities have been struggling with this issue for decades and are far from solving it. The message to both public and private schools is that goals must be elevated beyond high school graduation and college enrollment to success in those colleges. High schools may need to impart more advanced skills and study and research habits that will reduce the shock that college imposes on students from disadvantaged backgrounds.

Our findings contribute to a growing body of evaluation results indicating that private school voucher programs positively affect student educational attainment (Chingos and Peterson 2015; Chingos, Monarrez and Kuehn 2019; Cowen et al. 2013; Wolf et al. 2013). Our results closely parallel those of Matthew Chingos, Tomas Monarrez and Daniel Kuehn (2019) regarding the attainment effects of the Florida Tax Credit Scholarship Program. Using a student matching approach similar to the one that we use here, the evaluators of the Florida program find clear positive attainment effects of that voucher program on enrollment in, persistence in, and graduation from both two-year and four-year colleges. The magnitude of the four-year college attainment effects of the Florida program are nearly identical to those of the Milwaukee Parental Choice Program that we present here.

While it is comforting that separate research teams using similar methods report nearly identical results regarding the four-year college attainment effects of two different school voucher programs, and four other studies find neutral-to-positive effects of school choice on attainment, six sets of research results do not a deep literature make. More research on this vital question would be welcome.

Appendix

Here we present analytic results for both samples covering all attainment measures we tested. At the end we provide the complete regression results from the estimation of total years of college using the ninth-grade sample.

TABLE A.1

Ninth-Grade Sample Estimates with No Controls

	MPS in 2006	MPCP in 2006	Difference	*p*-value
Graduated high school	0.78	0.81	0.03 (0.02)	0.19
Ever enrolled in any college	0.56	0.59	0.03 (0.02)	0.23
Ever enrolled in two-year college	0.35	0.36	0.01 (0.02)	0.53
At least one year in two-year college	0.33	0.35	0.02 (0.02)	0.43
Total years in two-year college	0.81	0.73	-0.07 (0.07)	0.29
Graduated two-year college	0.04	0.03	-0.01 (0.01)	0.40
Ever enrolled in four-year college	0.37	0.42	0.05** (0.02)	0.05
At least one year in four-year college	0.36	0.41	0.05** (0.02)	0.04
Total years in four-year college	1.13	1.34	0.21** (0.10)	0.04
Graduated four-year college	0.12	0.12	0.00 (0.02)	0.88

Notes: N = 1,602. Average Treatment Effect (ATE) estimates from binary outcomes are marginal effects of 2006 MPCP enrollment from probit estimations, with standard errors in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

TABLE A.2

Ninth-Grade Sample Estimates with Limited Controls

	MPS in 2006	MPCP in 2006	Difference	*p*-value
Graduated high school	0.81	0.84	0.03 (0.02)	0.18
Ever enrolled in any college	0.58	0.62	0.04 (0.03)	0.12
Ever enrolled in two-year college	0.37	0.38	0.01 (0.03)	0.76
At least one year in two-year college	0.35	0.36	0.01 (0.03)	0.76
Total years in two-year college	0.87	0.75	-0.12 (0.09)	0.19
Graduated two-year college	0.04	0.03	-0.01 (0.01)	0.42
Ever enrolled in four-year college	0.38	0.45	0.07*** (0.03)	0.01
At least one year in four-year college	0.37	0.44	0.07*** (0.03)	0.01
Total years in four-year college	1.20	1.40	0.20** (0.10)	0.05
Graduated four-year college	0.13	0.14	0.01 (0.02)	0.75

Notes: N = 1,289. Average Treatment Effect (ATE) estimates from regressions that control for student race, gender, and baseline reading and math scores. Robust standard errors are clustered by census tract. Estimates from binary outcomes are marginal effects of 2006 MPCP enrollment from probit estimations, with standard errors in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

TABLE A.3

Ninth-Grade Sample with Subsample Controls for Parental Characteristics

	MPS in 2006	MPCP in 2006	Difference	*p*-value
Graduated high school	0.79	0.86	0.07*** (0.03)	0.01
Ever enrolled in any college	0.57	0.63	0.06* (0.03)	0.08
Ever enrolled in two-year college	0.33	0.38	0.04 (0.03)	0.20
At least one year in two-year college	0.32	0.36	0.04 (0.03)	0.26
Total years in two-year college	0.77	0.77	0.00 (0.11)	1.00
Graduated two-year college	0.03	0.04	0.01 (0.01)	0.46
Ever enrolled in four-year college	0.40	0.46	0.06** (0.03)	0.03
At least one year in four-year college	0.39	0.45	0.07** (0.03)	0.02
Total years in four-year college	1.21	1.36	0.15 (0.12)	0.22
Graduated four-year college	0.14	0.15	0.01 (0.02)	0.71

Notes: $N = 863$; N for high-school graduation =760. Average Treatment Effect (ATE) estimates from regressions that control for student race, gender, baseline reading and math scores, parent education, parent income, and parent religiosity. Robust standard errors are clustered by census tract. Estimates from binary outcomes are marginal effects of 2006 MPCP enrollment from probit estimations, with standard errors in parentheses.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

TABLE A.4

Third-through-Eighth-Grade Sample MPCP Estimates with No Controls

	MPS in 2006	MPCP in 2006	Difference	*p*-value
Ever enrolled in any college	0.45	0.48	0.03 (0.02)	0.11
Ever enrolled in two-year college	0.28	0.29	0.01 (0.01)	0.41
At least one year in two-year college	0.28	0.29	0.01 (0.01)	0.37
Total years in two-year college	0.57	0.58	0.00 (0.04)	0.91
Graduated two-year college	0.03	0.03	0.00 (0.01)	0.39
Ever enrolled in four-year college	0.26	0.30	0.03** (0.01)	0.03
At least one year in four-year college	0.26	0.29	0.03** (0.01)	0.04
Total years in four-year college	0.79	0.88	0.10* (0.05)	0.08
Graduated four-year college	0.08	0.09	0.01 (0.01)	0.23

Notes: N = 3,682; 2,422 for four-year graduation. Average Treatment Effect (ATE) estimates from regressions that include student race, gender, and baseline reading and math scores. Robust standard errors are clustered by census tract. Estimates are marginal effects of 2006 MPCP enrollment from probit estimations, with standard errors in parentheses. Graduation from two-year and four-year college limited to students in fourth grade and up or sixth grade and up in 2006–07, respectively (allowing them a minimum of two or four years post on-time high school graduation).
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

TABLE A.5

Third-through-Eighth-Grade Sample MPCP Estimates with Student Controls

	MPS in 2006	MPCP in 2006	Difference	*p*-value
Ever enrolled in any college	0.45	0.50	0.05*** (0.01)	0.00
Ever enrolled in two-year college	0.28	0.30	0.01 (0.01)	0.12
At least one year in two-year college	0.28	0.30	0.02* (0.01)	0.10
Total years in two-year college	0.57	0.60	0.02 (0.04)	0.53
Graduated two-year college	0.03	0.03	0.00 (0.01)	0.80
Ever enrolled in four-year college	0.26	0.32	0.05*** (0.01)	0.00
At least one year in four-year college	0.26	0.31	0.05*** (0.01)	0.00
Total years in four-year college	0.79	0.94	0.15*** (0.05)	0.00
Graduated four-year college	0.08	0.11	0.03*** (0.01)	0.00

Notes: N = 3,682; 2,422 for four-year graduation. Average Treatment Effect (ATE) estimates from regressions that include student race, gender, and baseline reading and math scores. Robust standard errors are clustered by census tract. Estimates are marginal effects of 2006 MPCP enrollment from probit estimations, with standard errors in parentheses. Graduation from two-year and four-year college limited to students in fourth grade and up or sixth grade and up in 2006–07, respectively (allowing them a minimum of two or four years post on-time high school graduation).
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

TABLE A.6

Full Regression Results of Total Years in Four-Year College, Ninth-Grade Sample

	Limited controls	Full controls
MPCP in 2006	0.20**	0.15
	(0.10)	(0.12)
Female	0.75***	0.96***
	(0.11)	(0.15)
African American	-0.12	-0.08
	(0.25)	(0.27)
Hispanic	-0.40	-0.18
	(0.29)	(0.33)
Asian	0.25	-0.25
	(0.44)	(0.47)
Baseline reading	0.52***	0.41***
	(0.07)	(0.08)
Baseline math	0.20**	0.21**
	(0.08)	(0.09)
Income >$50K		-0.09
		(0.21)
Income $35–50K		-0.01
		0.19)
Income $25–35K		-0.08
		(0.19)
Parent is high school graduate		0.35*
		(0.18)
Parent has some college		0.41***
		(0.16)
Parent is college graduate		0.86***
		(0.24)
High religiosity		0.01
		(0.14)
R-squared	0.14	0.16
N	1,298	863

Notes: Average Treatment Effect (ATE) estimates from regression with student controls (*N* = 1,289) include student race, gender, and baseline reading and math scores; estimates with full controls (*N* = 863) add parent education, parent income, and parent religiosity. Robust standard errors are clustered by census tract. Estimates are marginal effects from probit estimations.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Notes

1. Vermont and Maine began providing government funds to private schools in 1869 and 1873, respectively, to cover the tuition for students in rural areas that lacked public schools. We consider the MPCP meaningfully different from these early government-funded private school choice programs. The central purpose of the Milwaukee program is to provide families with a variety of educational options from which to choose. The central purpose of the Vermont and Maine town-tuitioning programs, in contrast, is to relieve their public school systems of the burden to build and operate expensive, comprehensive public schools in remote areas that lack a critical mass of students but where there are small, private schools. The Milwaukee voucher program is an exercise in parental school choice. The town-tuitioning programs are an exercise in government outsourcing.

2. Zelman v. Simmons-Harris, 536 U.S. 639 (2002).

3. "Milwaukee Parental Choice Program: MPCP facts and figures for 2017–18," Wisconsin Department of Public Instruction, October 2017.

4. Starting in 2011, three new and smaller Wisconsin school voucher programs were enacted. The first was limited to the city of Racine, Wisconsin. The Racine Parental Choice Program is similar to the current design of the MPCP. The program, launched in 2011, enrolled 2,915 students in 23 participating schools in 2017–18. The Wisconsin Parental Choice (statewide) Program was enacted in 2013 and remains targeted only to students with family incomes below 220 percent of the poverty level. The program currently serves 4,540 students in 154 private schools. In 2016, a statewide voucher program for students with disabilities was launched with an estimated enrollment of 244 students in 28 private schools 2017–18. Almost $275 million in education spending was channeled through the various voucher programs in Wisconsin in 2016–17. See "Racine Parental Choice Program: RPCP facts and figures for 2017–18," Wisconsin Department of Public Instruction, October 2017; "Wisconsin Parental Choice Program: WPCP facts and figures for 2017–18," Wisconsin Department of Public Instruction, October 2017; "Private School Choice Programs and Special Needs Scholarship Program Summary, 2017–18 School Year Student HC, FTE, and Annualized Payment," Wisconsin Department of Public Instruction, October 2017.

5. For example, a particular neighborhood might have flooded one year during high school, negatively affecting the attainment probabilities of all the students who lived there. Conversely, a neighborhood might have gentrified during the study, similarly boosting the attainment probabilities of students who live there. Clustering the errors in our regression estimations by neighborhood corrects for such spatial autocorrelation and thus produces more reliable standard errors and significance tests for the variables in our models, especially our variable of interest (MPCP participation). We also ran our models with neighborhood fixed effects instead of clustered standard errors and the results were virtually identical to those from our preferred, more efficient, analytic approach.

References

Aaronson, Daniel. 1998. "Using Sibling Data to Estimate the Impact of Neighborhoods on Children's Educational Outcomes." *Journal of Human Resources* 33 (4): 915–46.

Akerlof, George A., and Rachel E. Kranton. 2002. "Identify and Schooling: Some Lessons for the Economics of Education." *Journal of Economic Literature* 40 (4): 1167-1201.

Belfield, Clive R., and Henry M. Levin. 2007. "The Return on Investment for Improving California's High School Graduation Rate." Santa Barbara: California Dropout Research Project.

Betts, Julian R., Lorien A. Rice, Andrew C. Zau, Y. Emily Tang, and Cory R. Koedel. 2006. *Does School Choice Work? Effects on Student Integration and Achievement.* San Francisco: Public Policy Institute of California.

Bifulco, Robert, and Helen F. Ladd. 2007. "School Choice, Racial Segregation, and Test Score Gaps: Evidence from North Carolina's Charter School Program." *Journal of Policy Analysis and Management* 26 (1): 31–56.

Bifulco, Robert. 2012. "Can Nonexperimental Estimates Replicate Random Assignment in Evaluations of School Choice? A Within-Study Comparison." *Journal of Policy Analysis and Management* 31 (3): 729–51.

Booker, Kevin, Tim R. Sass, Brian Gill, and Ron Zimmer. 2011. "The Effects of Charter High Schools on Educational Attainment." *Journal of Labor Economics* 29 (2): 377–15.

Bound, John, Michael F. Lovenheim, and Sarah Turner. 2012. "Increasing Time to Baccalaureate Degree in the United States." *Education Finance and Policy* 7 (4): 375–24.

Brandl, John E. 1998. *Money and Good Intentions are Not Enough*. Washington, DC: Brookings.

Brandl, John E. 2006. "Choice, Religion, Community, and Educational Quality." In Enlow, Robert C., and Lenore T. Ealy (Eds.), *Liberty and Learning: Milton Friedman's Voucher Idea at Fifty*. Washington, DC: Cato.

Campbell, David E. 2008. "The Civic Side of School Choice: An Empirical Analysis of Civic Education in Public and Private Schools." *Brigham Young University Law Review* 2008 (2): 487–23.

Carlson, Deven, Joshua M. Cowen, and David J. Fleming. 2013. "Life after Vouchers: What Happens to Private School Students When They Return to the Public Sector?" *Educational Evaluation and Policy Analysis* 35 (2): 179–99.

Carneiro, Pedro, James J. Heckman, and Edward Vytlacil. 2003. "Understanding What Instrumental Variables Estimate: Estimating Marginal and Average Returns to Education." Working paper. University of Chicago.

Chingos, Matthew M., Tomas Monarrez, and Daniel Kuehn. 2019. *The Effects of Florida Tax Credit Scholarship Program on College Enrollment and Graduation: An Update*. Washington, DC: Urban Institute.

Chingos, Matthew M., and Paul E. Peterson. 2015. "Experimentally Estimated Impacts of School Vouchers on College Enrollment and Attainment." *Journal of Public Economics* 122 (1): 1–12.

Chubb, John E., and Terry M. Moe. 1988. "Politics, Markets and the Organization of Schools." *American Political Science Review 82* (4): 1065-1087.

Chubb, John E., and Terry M. Moe. 1990. *Politics, Markets and America's Schools*. Washington, DC: Brookings.

Coleman, James S., and Thomas Hoffer. 1987. *Public and Private High Schools: The Impact of Communities*. New York: Basic Books.

Cowen, Joshua M., David J. Fleming, John F. Witte, and Patrick J. Wolf. 2012. "Going Public: Who Leaves a Large, Longstanding, and Widely Available Urban Voucher Program?" *American Educational Research Journal* 49 (2): 231–56.

Cowen, Joshua M., David J. Fleming, John F. Witte, Patrick J. Wolf, and Brian Kisida. 2013. "School Vouchers and Student Attainment: Evidence from a State-Mandated Study of the Milwaukee Parental Choice Program." *Policy Studies Journal* 41 (1): 147–67.

Cullen, Julie Berry, Brian Jacob, and Steven Leavitt. 2005. "The Impact of School Choice on Student Outcomes: An Analysis of the Chicago Public Schools." *Journal of Public Economics* 89 (5–6): 729–60.

Day, Jennifer Cheeseman, and Eric C. Newburger. 2002. "The Big Payoff: Educational Attainment and Synthetic Estimates of Work-Life Earnings." Washington, DC: US Census Bureau.

DeAngelis, Corey A., and Angela K. Dills. 2018. "The Effects of School Choice on Mental Health." Social Science Research Network (October 24, 2018).

DeAngelis, Corey A., and Heidi Holmes Erickson. 2018. "What Leads to Successful School Choice Programs? A Review of the Theories and Evidence." *Cato Journal* 38 (1): 247-263.

DeAngelis, Corey A., and Patrick J. Wolf. 2019. "Private School Choice and Crime: Evidence from Milwaukee. *Social Science Quarterly*, Early View.

Dee, Thomas S. 2005. "The Effects of Catholic Schooling on Civic Participation." *International Tax and Public Finance* 12 (5): 605–25.

Egalite, Anna J., Laura I. Jensen, Thomas Stewart, and Patrick J. Wolf. 2014. "Finding the Right Fit: Recruiting and Retaining Teachers in Milwaukee Choice Schools." *Journal of School Choice* 8 (1): 113–40.

Egalite, Anna J., Jonathan N. Mills, and Patrick J. Wolf. 2017. "The Impact of Targeted School Vouchers on Racial Stratification in Louisiana Schools." *Education and Urban Society* 49 (3): 271–96.

Erickson, Heidi H. 2019. "How Do Parents Choose Schools, and What Schools Do They Choose? A Literature Review of Private School Choice Programs in the United States." In Wolf, Patrick J. (Eds), *School Choice: Separating Fact from Fiction*. New York: Routledge.

Fiske, Edward B., and Helen F. Ladd. 2000. *When Schools Compete: A Cautionary Tale*. Washington, DC: Brookings.

Fleming, David J. 2009. "Parents and Politics: How Parenthood and Education Policy Shape Civic and Political Behavior." PhD dissertation, Department of Political Science, University of Wisconsin.

Fleming, David J., Joshua M. Cowen, John F. Witte, and Patrick J. Wolf. 2015. "Similar Students, Different Choices: Who Uses a School Voucher in an Otherwise Similar Population of Students?" *Education and Urban Society* 47 (7): 785–812.

Friedman, Milton. 1955. "The Role of Government in Education. In Solo, Robert A. (Ed.), *Economics and the Public Interest* (pp. 123-144). New Brunswick, NJ: Rutgers University Press.

Greene, Jay P., Paul E. Peterson, and Jiangtao Du. 1999. "Effectiveness of School Choice: The Milwaukee Voucher Experiment." *Education and Urban Society* 31 (2): 190–213.

Greene, Jay P. 2005. "Choosing Integration." In *School Choice and Diversity: What the Evidence Says*, edited by Janelle Scott, 27–41. New York: Teachers College Press.

Heckman, JamesJ., and Edward J. Vytlacil. 2001. “Instrumental Variables, Selection Models, and Tight Bounds on the Average Treatment Effect.” In *Economic Evaluation of Labour Market Policies,* edited by Michael Lechner and Friedhelm Pfeiffer, 1–15. University of Chicago.

Henig, Jeffrey R. 1994. *Rethinking School Choice: Limits of the Market Metaphor*. Princeton, NJ: Princeton University Press.

Hill, Paul T., Gail E. Foster, and Tamar Gendler. 1990. *High Schools with Character*. Santa Monica, CA: RAND.

Howell, William G., Paul E. Peterson, Patrick J. Wolf, and David E. Campbell. 2006. *The Education Gap: Vouchers and Urban Schools.* Revised Edition. Washington, DC: Brookings Institution Press.

Kisida, Brian, and Patrick J. Wolf. 2015. “Customer Satisfaction and Educational Outcomes: Experimental Impacts of the Market-Based Delivery of Public Education.” *International Public Management Journal* 18 (2): 265–85.

Lauen, Douglas Lee. 2007. “Contextual Explanations of School Choice.” *Sociology of Education* 80 (3): 179–209.

Levitt, Steven D., and Lance Lochner. 2001. “The Determinants of Juvenile Crime.” In *Risky Behavior among Youths: An Economic Analysis,* edited by Jonathan Gruber, 327–74. University of Chicago Press.

Lleras-Muney, Adriana. 2005. “The Relationship between Education and Adult Morality in the United States.” *Review of Economic Studies* 72 (1): 180–221.

Lubienski, Christopher A., and Sarah Theule Lubienski. 2014. *The Public School Advantage: Why Public Schools Outperform Private Schools*. Chicago: University of Chicago Press.

McShane, Michael. 2013. “Does Mission matter? Examining the Role of Organizational Mission and Religious Identity in Schools Participating in the Milwaukee Parental Choice Program.” PhD dissertation, Department of Education Reform, College of Education and Health Professions, University of Arkansas.

Meara, Ellen, Seth Richards, and David Cutler. 2008. “The Gap Gets Bigger: Changes in Mortality and Life Expectancy, by Education, 1981–2000.” *Health Affairs* 27 (2): 350–60.

Mill, John Stuart. 1962 (1858). “On Liberty.” In Warnock, Mary (Ed.), *Utilitarianism, on Liberty, Essay on Bentham* (pp. 126-250). New York, NY: New American Library.

Muennig, Peter. 2005. “The Economic Value of Health Gains Associated with Education Interventions.” Paper presented at the Equity Symposium on the Social Costs of Inadequate Education, Teachers' College, Columbia University, New York, October 24–25.

Neal, Derek. 1997. “The Effects of Catholic Secondary Schooling on Educational Achievement.” *Journal of Labor Economics* 15 (1): 98–123.

Neal, Derek. 2006. “How Families and Schools Shape the Achievement Gap.” In *Generational Change: Closing the Test Score Gap,* edited by Paul E. Peterson. Lanham, MD: Rowman and Littlefield.

Paine, Thomas. 1791. *The Rights of Man*. London: J.S. Jordan.

Public Policy Forum. 2008. “Did Compromise Voucher Law Achieve Intended Purposes?” *Research Brief* 96 (1): February.

Rosenbaum, Paul R., and Donald B. Rubin. 1983. “The Central Role of the Propensity Score in Observational Studies for Causal Effects.” *Biometrika* 70 (1): 41–55.

Rouse, Cecilia Elena. 1998. “Private School Vouchers and Student Achievement: An Evaluation of the Milwaukee Parental Choice Program.” *Quarterly Journal of Economics* 113 (2): 553–602.

Schneider, Mark, Paul Teske, Melissa Marschall, Michael Mintrom, and Christine Roch. 1997. "Institutional Arrangements and the Creation of Social Capital: The Effects of Public School Choice." *American Political Science Review* 91 (1): 82–93.

Setren, Elizabeth. 2019. The Impact of Targeted vs. General Education Investments: Evidence from Special Education and English Language Learners in Boston Charter Schools. (EdWorkingPaper No. 19-100). Annenberg Institute at Brown University, Providence, RI.

Smith, Keven B., and Kenneth J. Meier. 1995. *The Case Against School Choice: Politics, Markets and Fools*. New York, NY: Routledge.

Stewart, Thomas, and Patrick J. Wolf. 2014. *The School Choice Journey: School Vouchers and the Empowerment of Urban Families*. New York, NY: Palgrave Macmillan US.

Wirt, John, Susan Choy, Patrick Rooney, Stephen Provasnik, Anindita Sen, and Richard Tobin. 2004. *The Condition of Education*. NCES 2004-077. Washington, DC: US Department of Education, National Center for Education Statistics.

Witte, John F. 2000. *The Market Approach to Education: An Analysis of America's First Voucher Program.* NJ: Princeton University Press.

Witte, John F., Patrick J. Wolf, Joshua Cowen, David J. Fleming, and Juanita Lucas-McLean. 2008. *MPCP Longitudinal Educational Growth Study Baseline Report*. Milwaukee Evaluation report 5. Fayetteville: University of Arkansas.

Witte, John F., Patrick J. Wolf, Joshua M. Cowen, Deven E. Carlson, and David J. Fleming. 2014. "High-Stakes Choice Achievement and Accountability in the Nation's Oldest Urban Voucher Program." *Educational Evaluation and Policy Analysis* 36 (4): 437–56.

Wolf, Patrick J. 2012. *The Comprehensive Longitudinal Evaluation of the Milwaukee Parental Choice Program: Summary of Final Reports.* Milwaukee Evaluation report 36. Fayetteville: University of Arkansas.

Wolf, Patrick J., and Shannon Lasserre-Cortez. 2018. *Special Education Enrollment and Classification in Louisiana Charter Schools and Traditional Schools.* REL 2018–288. Washington, DC: US Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Southwest.

Wolf, Patrick J., John F. Witte, and David J. Fleming. 2012. "Special Choices: Do Voucher Schools Serve Students with Disabilities?" *Education Next* 12 (3): 16–22.

Wolf, Patrick J., Brian Kisida, Babette Guttmann, Michael Puma, Nada Eissa, and Lou Rizzo. 2013. "School Vouchers and Student Outcomes: Experimental Evidence from Washington, DC." *Journal of Policy Analysis and Management* 32 (2): 246–70.

Zeehandelaar, Dara, and Amber M. Winkler. 2013. *What Parents Want: Education Preferences and Trade-Offs*. Washington, DC: Thomas B. Fordham Institute.

Zimmer, Ron, Brian Gill, Kevin Booker, Stephane Lavertu, Tim R. Sass, and John F. Witte. 2009. *Charter Schools in Eight States: Effects on Achievement, Attainment, Integration and Competition.* Santa Monica, CA: RAND.