

Pathways to Education: An Integrated Approach to Helping At-Risk High School Students

Philip Oreopoulos

University of Toronto, National Bureau of Economic Research, and Canadian Institute for Advanced Research

Robert S. Brown

Toronto District School Board

Adam M. Lavecchia

University of Ottawa

Pathways to Education is a comprehensive support program developed to improve academic outcomes of high school students from very poor social-economic backgrounds. The program includes proactive mentoring, daily tutoring, and group activities, combined with intermediate and long-term incentives to reinforce a minimum degree of mandatory participation; it began in 2001 for entering grade 9 students living in Regent Park, the largest public housing project in Toronto. It expanded in 2007 to include two additional Toronto projects. Comparing students from other housing projects before and after the introduction of the program, high school graduation and postsecondary enrollment rates rose dramatically for Pathways-eligible students, in some cases by more than 50 percent.

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I. Introduction

Children from very poor social-economic backgrounds are subject to many stresses while growing up and are vastly more at risk of ending up poor, incarcerated, unhealthy, and unhappy than children from more affluent backgrounds (Lynn and McGahey 1990; McLoyd 1998; Holzer et al. 2008). Not only do impoverished children often receive poorer parental investments—in part because parents are subject to many social-economic stresses themselves—they also are exposed to far worse school and neighborhood environments at critical development stages. This compounding adversity can take a serious psychological toll (Dearing 2008). Ethnographic studies document harsh realities from being regularly exposed to violence, subject to low expectations, and, overall, “weighed down by a world of no” (Osofsky 1999; Dvorak 2010; Polidano, Broadway, and Buddelmeyer 2012).¹

Overarching programs have long been sought to meaningfully overcome these challenges. Evidence on their effectiveness is usually disappointing, but there are exceptions (Camilli et al. 2010). Preschool interventions involving home visits to offer support and advice have proven effective in helping improve human capital among disadvantaged children (Olds et al. 2004; Schweinhart et al. 2005; Gertler et al. 2014; Attanasio et al. 2015). Researchers suggest that the long-term benefits from these programs may work by encouraging the development of not only cognitive skills, such as numeracy and reading, but also noncognitive skills such as perseverance, conscientiousness, and grit. In turn, improvement in these skills may make it easier to encourage development at later ages (a feature known as dynamic complementarity; Cunha and Heckman 2007). Many have concluded from this research that early childhood is a critical period for promoting human capital (Heckman 2004; Cunha, Heckman, and Schennach 2010; Aizer and Cunha 2012; Caucutt and Lochner 2012; Heckman, Pinto, and Savelyev 2013; Attanasio et al. 2015).

More recent research also suggests that adolescence is a critical period of skill development (Selemon 2013; Steinberg, forthcoming). In line

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¹ For ethnographic study examples, see Venkatesh (2002) and the BBC documentary series *Growing Up Poor* (<http://www.bbc.co.uk/programmes/b01s8p78/episodes/guide>).

with this possibility, impressive long-term benefits have accrued to disadvantaged teenagers accepted to some chartered schools via lottery (Abdulkadiroglu et al. 2011; Dobbie and Fryer 2011). Dobbie and Fryer (2013) identify common features among them, including more time in school, tutoring, after-school assistance, and a culture of high expectations. Fryer (2014) finds that applying these features to public schools can generate similar effects. Similarly, impressive gains to high school attainment and academic performance are found in another recent randomized trial that provided daily two-on-one tutoring combined with social-cognitive behavioral therapy to disadvantaged students from Chicago (Cook et al. 2014).

This paper evaluates another comprehensive effort to help at-risk youth. The Pathways to Education Program (Pathways) began as a grassroots effort by community workers in Regent Park, Canada's oldest and largest public housing project, in Toronto. Regent Park is one of Canada's poorest neighborhoods. It comprises 2,087 high- and low-rise apartment units within a self-contained downtown community and is home to 7,500 residents, all paying rent geared to income. The community faces relatively high levels of crime and gang activity. From the 2001 census, 87 percent of family households living in Regent Park are classified as being below Statistics Canada's Low-Income Cut-Off (LICO), 56 percent of residents are single parents, and 59 percent of residents have no earnings.² In the 1990s, more than half of Regent Park youths failed to complete high school.

Against this backdrop, the Board of Directors for the Regent Park Community Health Centre began developing a program to promote and support academic achievement for Regent Park youths, with the ultimate goal of fostering a more positive community environment. The program adopts a multifaceted approach, offering extensive tutoring, mentoring, financial support (such as bus tickets tied to school attendance and bursaries for postsecondary schooling), and easy access to student-parent workers who provide information and advice on a wide range of issues. After several years of consultation and fund-raising, the program began in the 2001–2 school year for entering grade 9 students from Regent Park and was phased in for successive grade 9 cohorts each year thereafter. Eligibility is based solely on residing in Regent Park, though participation requires a written commitment by both parents and students to the program's high expectations.

We estimate the effect of Pathways' eligibility on high school completion, postsecondary enrollment, and intermediate high school achieve-

² A household falls below the LICO if it spends more than 20 percentage points above the average comparative household on food, clothing, and shelter. For example, if the average Canadian family spends 35 percent of before-tax income on food, clothing, and shelter, a family that spends more than 55 percent of before-tax income on these items falls below the LICO.

ment measures. Our difference-in-differences empirical strategy compares students from Regent Park to students from other Toronto public housing projects before and after the introduction of the program in 2001. Two key features of Pathways' rollout make it amenable to a rigorous evaluation. First, the program was not announced to residents prior to its initial recruitment. This feature, combined with long wait times for subsidized housing in Toronto, makes it unlikely that motivated students and families could have sorted into Regent Park. Second, since enrollment was phased in for successive cohorts, we can compare eligible students living in Regent Park to students living in other public housing projects before and after 2001. We find that Pathways had high participation rates, rising to more than 85 percent after 3 years. Eligibility for Pathways increased high school completion by 35 percent (from 44 to 59 percent) and postsecondary enrollment by more than 60 percent (from 31 to 50 percent). We also detect intermediate effects on math and reading grades and on the likelihood of taking more university prerequisite courses. Pathways affects females more than males, higher initial ability students more than lower ability, and immigrant and nonimmigrant families equally. We check the internal and external validity of the Regent Park estimates by exploiting the expansion of Pathways in 2007 at two additional Toronto housing projects (Rexdale and Lawrence Heights). As in Regent Park, high school completion effects are large, but mostly for females, while 2-year community college going effects are large, but mostly for males.

The next section details the structure of the Pathways program. Section III describes the data and empirical strategy. Section IV presents the main results and sensitivity checks. In Section V, we discuss possible mechanisms underlying the results and present a mediation analysis. Section VI presents conclusions and provides an outline for further research.

II. The Structure of the Pathways to Education Program

Eligibility for Pathways is inclusive, based only on residence, and is available to every Regent Park youth attending high school (beginning with students entering grade 9 in 2001 and continuing with successive entering grade 9 cohorts thereafter).³ The program expanded in 2007 to include two additional disadvantaged neighborhoods, Rexdale and Lawrence Heights.⁴ Participation in Pathways is voluntary and requires

³ For more details about the origins and administration of Pathways to Education, see online app. B, as well as Bales (2004), Rowen and Gosine (2006), and Rowen (2012).

⁴ Pathways has since expanded to more than 11 additional sites across Canada, including a fourth site in Toronto (Scarborough Village) and sites in Ottawa, Vancouver, and Montreal.

both students and parents to agree each year in writing to the program's conditions and high expectations.⁵ To recruit students, Pathways developed strong ties with the five elementary schools that include Regent Park in their catchment areas. Schools help identify eligible students, provide contact information, and facilitate introductory presentations with students and parents.

There are four pillars of support to the Pathways program: counseling, academic, social, and financial. Each student is assigned to a student-parent support worker (SPSW), who is employed full-time by Pathways. SPSWs serve as the main connection between students and the program. They are responsible for working with each student and parent to help ensure academic success. The relationship begins prior to the start of high school at a mandatory orientation session. Students are required to meet with their SPSWs at least twice a month, more if needed. Meetings are scheduled at specific times, often during lunch or after class, and are held either at school or at the Pathways office. Through their relationships with high schools, SPSWs monitor students' absenteeism, grades, and participation in other Pathways activities. They provide information to students about events and community resources and distribute free bus tickets. SPSWs often serve as the go-to people for dealing with any issue that may arise at home, at school, or around the community.⁶ They are each responsible for approximately 50 students over a school year, though much of their time is focused on those with the most need. If crises or issues arise, they may work together with other facilitators to determine how to best manage these situations. Many SPSWs maintain contact with their students after graduation on an informal basis.⁷

Pathways participants also receive extensive academic support in the form of free tutoring, usually at a local church hall, for up to four nights a week. Tutoring is conducted in small groups and on a one-on-one basis. It is available in core academic subjects, as well as for development of literacy and general study skills. Tutoring is mandatory twice a week, with exemptions for students with a previous term grade average above a threshold (60 percent in grade 9, 70 percent in grade 10 and beyond). Tutors are volunteers that receive some training and help about 5 hours per week, on average. They include accountants, retired teachers, investment bankers, parents, graduate students from teacher colleges, and cur-

⁵ Copies of both agreements are shown in app. A.

⁶ As one SPSW put it, "I support [students] through their schooling, through their family, peer issues, sometimes I'm an advocate for them, and sometimes I'm sort of the voice of reason, or sometimes I'm just a sounding board—someone to vent to. So really, I just go with what the students need to do."

⁷ A 2009 documentary film, *Invisible City*, follows two struggling Regent Park and Pathways students over 3 years and an SPSW worker who tries to help them. The film can be viewed at http://www.nfb.ca/film/invisible_city/trailer/invisible_city_trailer.

rent and former Pathways students. The student-tutor ratio is generally less than 5:1. Students who SPSWs believe would benefit from special attention often get one-on-one support.

In grades 9 and 10, Pathways students receive social support in the form of group mentoring. Students select at least two activities a month from a wide range of daily options designed to foster social and group work skills and a commitment to the community. Previous examples included attending sporting events, theater, participating in creative arts, cooking, bowling, community recycling projects, and martial arts. Group mentoring now includes workshops from the “YouCan” program to teach cognitive behavioral therapy (<http://www.youcan.ca>). Other activities include the photography program, Adventures in Science, Big Brothers/Sisters, recreation, and art. Mentoring groups typically comprise about 15 youths and three volunteer mentors, who are often university students. By grades 11 and 12, students may still choose from the specific activities offered but also may play more of an active role in choosing more independent activities based on their own talents and interests. SPSWs and students agree on biweekly activities that may occur within or outside of the community (including tutoring younger grades). Social support also comes in the form of career mentoring. Pathways offers many events for students preparing to exit high school, including resume preparation classes, job interview practice, college and university campus visits, and visits to potential employers. Students also receive personal assistance from SPSWs on postsecondary applications, including fee waivers.

The final pillar of Pathways support is financial. Support comes in two forms: immediate assistance to help with the costs of going to school and longer-term assistance to help with the costs of going to college. Immediate financial assistance is in the form of free public transportation tickets and school supplies, but Pathways’ participants must meet with their SPSWs to get them. Tickets are allocated biweekly on the basis of previous period school attendance.⁸ Since the three high schools most commonly attended by Pathways’ students are 2, 3, and 5 kilometers away, the tickets provide a strong motivation for program participation and school attendance, according to focus groups and Pathways’ staff.⁹ Longer-term fi-

⁸ In March 2015, the one-way public transit fare was \$2 per trip for high school students. A weekly (monthly) pass that allows an unlimited number of rides was \$33 per week (\$112 per month) for high school students (https://www.ttc.ca/Fares_and_passes/Prices/index.jsp).

⁹ In one focus group, a student remarked, “If I don’t go to school one day and like next time, I get my tickets, my SPSW would be like, you didn’t go to school these days, and so you’d get two less tickets ’cause this day you didn’t go to school so you shouldn’t have those tickets and so you know, you can’t skip because you’re like damn I need these tickets.” Another grade 11 student remarked, “I have to go [to tutoring] because of Pathways. If I don’t go I’m not gonna get my tickets to go to school, if I don’t get my tickets, I can’t go to school there’s no other way . . . except . . . walking.”

nancial assistance is provided through a trust fund for each participant. The program sets aside \$1,000, up to a maximum of \$4,000 (tax-free), for each year of participation that can be used toward tuition and other postsecondary expenses after high school graduation.¹⁰

If students in Pathways miss school, SPSW meetings, tutorial sessions, or group mentoring workshops, their SPSWs will actively reach out to them. SPSWs first focus on encouraging attendance before mentioning the possibility of program withdrawal. If lack of participation is discussed and no meaningful response occurs, a warning letter is sent home to a parent encouraging the student to participate more. If there is still no progress, the student may be dropped from the program. Very few students are ultimately dropped, however, since the approach usually is to keep reengaging. As the Pathways coordinator of tutoring and mentoring previously remarked, “We do not give up easily. . . . Our philosophy is that you set high expectations and the kids will rise to them. If they haven’t met them, they are on their way. If they have made a mistake, we try to help them see it as a small setback” (Bales 2004).

III. Data and Methodology

A. Toronto District School Board Data

Data for this study come from three main sources: the Toronto District School Board (TDSB), Toronto Community Housing, and Pathways administrators. This section summarizes the three data sets and the construction of key variables. More details are provided in online appendix C. TDSB administrative data are available for high school students who entered grade 9 beginning in 2000, the year before Pathways was introduced. Our baseline data begin with all recorded students entering grade 9 at a TDSB school between 2000 and 2008.¹¹ Background information includes gender, immigrant status, immigrant year of arrival, language spoken at home, age, high school attended, and residential address. Cohort data for one earlier year (ninth graders in 1999) exist, but only for students attending schools in the former City of Toronto, before it was amalgamated to include several suburbs.¹² We use this additional year of data to check whether

¹⁰ The postsecondary bursary covers a significant fraction of postsecondary tuition. Average 4-year university undergraduate tuition in Ontario ranged from \$5,000 per year to \$7,000 per year from 2006 to 2014 (from Statistics Canada’s socioeconomic database, CANSIM table 477-0021). Average 2-year community college tuition is approximately \$3,000 per year (<http://www.ontariocolleges.ca/colleges/paying-for-college>).

¹¹ Students attending Catholic or private schools are therefore not included in the analysis. This omission does not likely affect the results given the small fraction attending non-TDSB schools (about 10 percent) and the fact that Pathways eligibility is based on location of residence, not location of school.

¹² These suburbs include the municipalities of East York, Etobicoke, North York, Scarborough, and York. Brown (2006) describes the data in more detail.

the Regent Park results depend significantly on having one or two pre-Pathways cohorts.

We estimate Pathways' impact on a variety of outcomes, beginning in grade 9. The TDSB data contain information on grade 9 performance in mathematics and English courses. For each year and cohort, these variables are standardized to have a mean of zero and a standard deviation of one. We construct a summary dummy variable for grade 9 performance equal to one if a student fails at least one of grade 9 math or English (which we call "low grade 9 grades") and zero otherwise. For junior and senior classes, we have transcript information with the average grade for all grade 11 and 12 courses ever taken, regardless of when the course was taken and whether the course was passed or dropped. This variable is also standardized.

Our data indicate whether students passed both the reading and writing components of the Ontario Secondary School Literacy Test (OSSLT) when the test was initially taken in grade 10, a requirement for high school completion. Further, we record whether a student takes courses in grades 9 and 10 that place him or her on a university track. Under the Ontario secondary school curriculum, students choose a program of study that includes grade 9 and 10 courses classified as academic (university-directed), applied (college-directed), or locally developed essentials (workplace-directed). Our indicator variable takes a value of one if a majority of grade 9 and 10 courses are academic and zero otherwise.¹³

Our outcome variable for high school graduation is equal to one for students recorded as completing their Ontario Secondary School Diploma by the end of their fifth year since entering high school (in grade 9) or as having completed at least 30 credits (a student with 30 or more credits, but not recorded as graduated, is likely misclassified). Otherwise, it is equal to zero for students who either (i) remained in the TDSB system the following fall (in year 6), (ii) transferred outside TDSB to another school system, or (iii) left school without graduating.

Ontario's two central application service organizations for postsecondary education (one for colleges, another for universities) provide TDSB with application data and confirmations, acceptances, and registrations. Therefore, we know whether students applied, accepted, and registered to attend a college or university program within 5 years. Students are permitted to accept only one offer. For exposition, we refer to those registered as enrolled, since the outcome is associated with paying initial fees and choosing courses (Brown 2006).

¹³ About three-quarters (75.8 percent) of Toronto students from the 2000 cohort are classified as on the academic track, compared to about half (48.5) for our sample of public housing tenants.

B. Public Housing Address Data

The TDSB data are matched to Toronto public housing projects using uniquely identifiable postal codes. We focus on the 113 projects built before 1976 by the Metro Toronto Housing Corporation Authority, now called Toronto Community Housing (TCH).¹⁴ To create a publicly available data set, some nearby small projects are grouped together, so we end up with 70 housing project groups. Addresses for these locations were obtained from TCH and cross-checked using Canada Post's online postal code finder. Every household residing in these projects pays rent geared to income, with approximately 25–30 percent of a household's gross total income charged as rent.¹⁵

The TCH application process is centralized. Although applicants are able to state preferences, families have an incentive to remain eligible for as many housing projects as possible. Around the time of the introduction of Pathways in Regent Park, average wait times for public housing averaged 5–7 years (Toronto Social Housing Connections 1998). Given this excess demand, offers of accommodation were given to families with the greatest financial need. Pathways was not announced to residents prior to its initial recruitment, both in Regent Park and in the 2007 expansion sites, Rexdale and Lawrence Heights. Given the chronological approach to assigning applicants to public housing units and the long wait times, it is unlikely that households with a preference for these projects because of Pathways would be in our data (in general, applicants prefer smaller projects to avoid living in neighborhoods with a high density of poor households). Movement across projects is rare and is not allowed without an exceptional reason (e.g., change in work location).

We match public housing postal code addresses, recorded when entering grade 9, to the TDSB data. Each code generally refers to one side of a city street, often covering only one block or a single apartment building. Approximately three-fourths of families living in these postal codes were located in public housing addresses with unique postal codes. To ensure similarity across our sample, we use only postal codes that uniquely match to these projects. With this match, our baseline sample is 7,770 students who began grade 9 at a TDSB high school between 2000 and 2008 while residing in a Toronto public housing project in which all parents were subject to rent geared to income.

¹⁴ Projects that accommodate seniors, Aboriginals, or special-needs people are omitted.

¹⁵ Smaller TCH projects built after 1976 allowed for mixed housing, with some households paying rent geared to income and others paying market rent. For the main analysis, we omit these residences to focus on a comparison group of grade 9 students whose parents pay rent only geared to income. In an unreported robustness check, we find that the inclusion of these "nonunique matches" does not affect our main estimates.

C. *Pathways Participation Data*

Pathways registration and participation data are also matched to the baseline TDSB data. Pathways administrators provided a list of all students ever registered for the program since its inception in 2001. Information on student name, gender, date of birth, and Ontario Education Number made it possible to link the two data sets.

We also have registration status for 2007. This allows us to examine changes in registration status between grade 9 and grade 12 for the 2003 cohort, changes in status between grade 9 and grade 11 for the 2004 cohort, and changes in status between grade 9 and grade 10 for the 2005 cohort. Finally, we have information on recorded monthly mentoring and tutoring sessions. Data quality is questionable for earlier years, so we use data from the 2010 grade 9 cohort as a representative case.

D. *Qualitative Interviews*

To better understand the complexities and challenges faced in operating such an extensive program, we conducted interviews with Pathways staff. These discussions provided an opportunity to listen to SPSWs, tutors, and other administrators about their experiences and impressions of what mechanisms may be at play. We conducted 10 interviews in total, about 1 hour each. While these interviews cannot provide conclusive information about causal mechanisms behind the program, they illustrate how the program may be helping. We reference these interviews throughout the paper and in the appendix.

E. *Difference-in-Difference Analysis*

Program eligibility effects are estimated from a difference-in-differences methodology, which compares the relative differences in outcomes between students from Regent Park, Rexdale, and Lawrence Heights and students from other housing projects before and after Pathways was introduced. Our baseline results are from the following regression model:

$$y_i = \beta T_{p(i)c(i)} + \delta' X_i + e_{p(i)} + e_{c(i)} + e_i, \quad (1)$$

where the subscript i denotes individuals, p denotes housing projects, and c denotes cohorts (year entered grade 9). The term y_i is an outcome variable for individual i , T is a dummy variable indicating whether an individual is eligible for Pathways, and X is a vector of the individual's demographic characteristics (gender, age in grade 9, immigrant status, and a dummy for whether English is the primary language spoken at home). All specifications include housing project fixed effects ($e_{p(i)}$) and

year (cohort) fixed effects ($e_{c(i)}$). The coefficient of interest is β , the average effect of being eligible to participate in Pathways. We explore whether Pathways generated similar effects when the program was initially introduced in Regent Park and when it was expanded by estimating program eligibility effects separately for Regent Park over the 2000–2006 period and for the two expansion sites over the 2001–8 period.¹⁶ Given the small sizes of Rexdale and Lawrence Heights, the two sites are combined and are collectively referred to as Rexdale/LH.¹⁷ Standard errors are clustered by housing project to allow for correlation in the outcomes of students residing in the same housing project across school years.¹⁸ We also present results using grouped means in appendix D.¹⁹

The difference-in-differences approach requires the assumption that the counterfactual outcome path for Pathways projects follows the same pattern as the comparison projects. We conduct a number of sensitivity checks to assess this. First, we use alternative comparison groups (only very large projects, only downtown projects, only future projects [for Regent Park], or only projects within the 13 city-designated “at-risk” neighborhoods). Second, we include the preprogram 1999 cohort by restricting the sample to students in the old City of Toronto. This reduces our reliance on using only one year of preprogram data for estimating the Regent Park results, but at the cost of reducing the sample size for the analysis.²⁰ Further, using the introduction of more than one program over different time periods allows us to compare effects across different sites, providing a robustness check to the results from the initial site and a

¹⁶ Combined average program effect estimates over the 2000–2008 period are shown in the appendix. An alternative approach of estimating separate Pathways effects for Regent Park and Rexdale/Lawrence Heights over the 2000–2008 period requires dropping observations from the other treated site and thus reducing sample size. Results are similar and are reported in the next section.

¹⁷ We also report estimated program effects for each new site, which are generally similar, but with confidence intervals being too wide to draw precise conclusions.

¹⁸ Following Cameron and Miller (2015), with 70 housing projects (clusters) in the final data set, inference is based on the critical values of the t -distribution using $70 - 1 = 69$ degrees of freedom.

¹⁹ Using a series of Monte Carlo experiments, MacKinnon and Webb (2017) show that standard error estimates may be biased downward when cluster (group) sizes vary and the proportion of treated clusters is small, even with a large total number of clusters. Their experiments show that the wild cluster bootstrap described in Cameron, Gelbach, and Miller (2008) is typically more reliable in these situations. One exception is when the number of treated groups is small (fewer than four in their simulations), as in our application. In these cases, the wild cluster bootstrap is severely biased toward rejecting true effects. As there is currently no consensus, we report results using standard errors clustered by housing project in our baseline results.

²⁰ In Oreopoulos, Brown, and Lavecchia (2014), we also use the 1991, 1996, 2001, and 2006 micro census and demonstrate that a more detailed set of average background characteristics for Regent Park and the control group projects remain relatively similar over a longer time series than the analysis here.

check of the program's external validity. It is also reassuring that we find similar effects across subgroups, suggesting that our findings are not spurious.

F. Descriptive Statistics

Table 1 presents sample size counts of our baseline data. From the 7,770 students entering a TDSB school in grade 9 between 2000 and 2008 from a TCH housing project, 1,296 are from Regent Park, 854 are from Rexdale/LH, and 5,620 are from other projects. Each year, we track roughly 140 students entering grade 9 from Regent Park, 90 students from Rexdale/LH, and about 600 students from other projects. In comparison, the TDSB's 2000 grade 9 cohort consisted of 18,798 students (Brown 2006).

G. Pathways Registration and Participation

Beginning in the 2001–2 school year, all children entering grade 9 and living in Regent Park are eligible to participate in Pathways. Similarly, entering grade 9 students living in Rexdale/LH became eligible in 2007–8. Participation requires students and their parents to register each year by completing an agreement form. Figure 1 shows Pathways registration rates among TDSB students entering grade 9 between 2000 and 2008 from Regent Park and Rexdale/LH. For the program's first year in Regent Park, 58.8 percent of eligible students registered. In the second year, the fraction registered climbed to 80.7 percent, and, by the third year, 89.3 percent of all eligible TDSB Regent Park students enrolled in the program. Participation remained high for the next 5 years and was similarly impressive at the Rexdale and Lawrence Heights sites, where Pathways was introduced for the 2007 cohort. Not shown in the figure, but noteworthy, is that grade 9 registration rates are similar for males and females, English-speaking and non-English-speaking students, and low- and high-performing students.

Participation in various Pathways activities was not well recorded. Before 2008, no data were collected on public transportation ticket provision or SPSW meetings. A representative sample of 2014 SPSW monthly case notes suggests that students meet about twice a month with SPSWs, sometimes more. The notes indicate that SPSWs were very active in academic matters and follow up not only with students but also with parents, teachers, counselors, and principals. Tables 2 and 3 summarize monthly mentoring and tutoring participation for 2010 Pathways registrants by grade level. Generally, participants are required to attend two tutoring sessions each week unless exempted because of grade performance. We

TABLE 1
 DESCRIPTIVE STATISTICS OF HIGH SCHOOL STUDENTS FROM REGENT PARK, REXDALE/LAWRENCE HEIGHTS,
 AND OTHER PUBLIC HOUSING PROJECTS BY YEAR ENTERED GRADE 9

	2000-2008	2000	2001	2002	2003	2004	2005	2006	2007	2008
A. Regent Park										
Female	.503	.515	.5	.527	.489	.5	.478	.592	.495	.438
Age	14.1	14.1	14.0	14.1	14.1	14.0	14.1	14.1	14.0	13.0
English 2nd language	.756	.745	.77	.733	.725	.804	.754	.692	.727	.849
Sample size	1,296	165	148	150	131	138	134	130	154	146
B. Rexdale/LH										
Female	.481	.584	.547	.54	.471	.429	.536	.423	.444	.395
Age	14.1	14.1	14.1	14.1	14.0	14.1	14.1	14.0	14.0	14.1
English 2nd language	.532	.472	.427	.46	.437	.571	.591	.567	.586	.605
Sample size	854	89	75	87	87	84	110	104	99	119
C. Other Public Housing										
Female	.486	.527	.507	.486	.487	.463	.466	.456	.485	.497
Age	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.0	14.0
English 2nd language	.451	.368	.417	.419	.424	.425	.474	.486	.5	.518
Sample size	5,620	609	590	570	587	624	601	634	670	735

NOTE.—Panel A reports total and annual means of select demographic variables for students enrolled in grade 9 in the TDSB and who reside in the Regent Park housing project. Panel B shows the same, but for students who reside in the Rexdale and Lawrence Heights projects. In panel C, “Other Public Housing” refers to the sample of students who enrolled in grade 9 in the TDSB in the year(s) indicated and who reside in Toronto public housing projects other than those mentioned above.

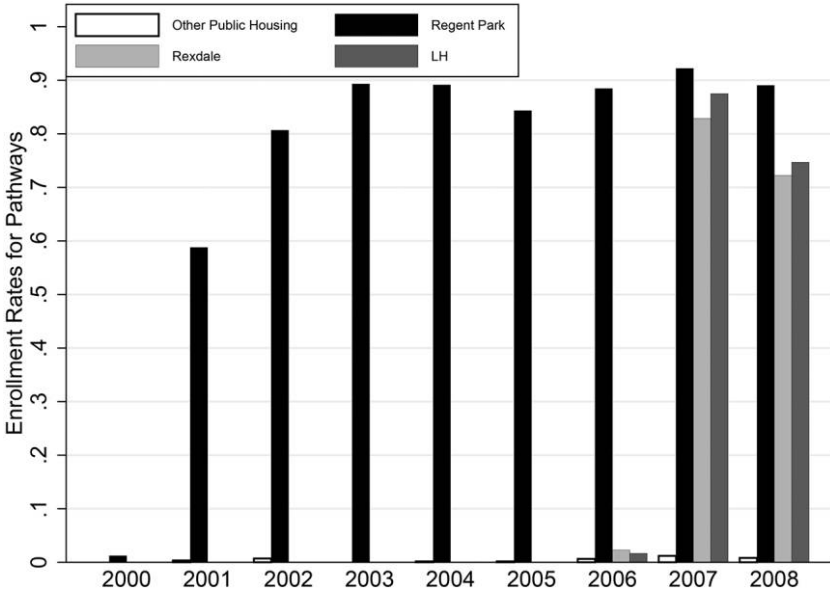


FIG. 1.—Pathways to Education registration rates for 2000–2008 grade 9 students from Regent Park, Rexdale, Lawrence Heights, and other Toronto public housing projects. The sample in this figure includes students from Toronto public housing residences (Regent Park, Rexdale or Lawrence Heights, or other public housing) who entered a TDSB high school in grade 9 between the 2000–2001 and 2008–9 academic years. The figure indicates the fraction of this sample that ever registered in the Pathways program. Other public housing refers to students who enrolled in grade 9 in the TDSB and who live in public housing projects other than Regent Park, Rexdale, and Lawrence Heights.

therefore focus on October, when sessions were held each week and fall grades were not yet available to determine exemption status.²¹

IV. Impact of Pathways on High School Achievement and Postsecondary Enrollment

A. Graphical Summary

Figures 2A and 2B summarize our high school completion results graphically. Figure 2A plots the 5-year high school completion rate by cohort (year entered grade 9) separately for Regent Park, Rexdale/LH, and the other Toronto public housing projects: 38.2 percent of students from Regent Park who entered grade 9 in 2000 (and therefore were not eligi-

²¹ SPSWs are provided with reports of student academic performance in late November, February, April, and the beginning of September (for any summer courses taken). On the basis of whether their grades in core academic subjects (math, English, and science) are above the prespecified cutoff, students are exempt from attending tutoring activities.

TABLE 2
TUTORING SESSION ATTENDANCE IN OCTOBER AMONG 2010 PATHWAYS REGISTRANTS,
BY GRADE LEVEL

	Grade 9	Grade 10	Grade 11	Grade 12
	A. Regent Park			
Fraction attending at least one tutoring session in October	.78	.32	.33	.22
Number of October sessions attended among active participants:				
25th percentile	3	1	1	1
50th percentile	6	4	2	2
75th percentile	8	8	5	4.5
	B. Rexdale/LH			
Fraction attending at least one tutoring session in October	.74	.61	.58	.61
Number of October sessions attended among active participants:				
25th percentile	2	2	1.83	2.42
50th percentile	4.17	3.75	4.33	4.33
75th percentile	6.67	4.92	9	7

NOTE.—Panel A reports per-grade measures of participation in Pathways tutoring activities for students registered for Pathways in Regent Park for the 2010 academic year. Panel B reports the same for students registered in Rexdale/LH for the 2010 academic year.

ble for Pathways) graduated by their fifth year.²² The graduation rate for students entering grade 9 a year later—the first year Pathways was introduced—rises to 52.0 percent, a 13.8 percentage point increase. The rate increases further, to 60.0 percent for the 2002 grade 9 cohort, and then remains relatively stable to 2008, with the exception of a jump up in 2004 (to 68.1 percent) and a jump down in 2005 (to 53.0 percent). Therefore, the jump in the graduation rate for Regent Park students corresponds exactly to the rise in Pathways participation (58.8 percent in 2001 and 80.3 percent in 2002).

To estimate the program's overall impact on becoming eligible, we assume that graduation rates in Regent Park would have followed the same pattern as in other projects if Pathways had not been introduced. Figure 2*B* displays this graphically by normalizing graduation rates by initial site differences in 2000. Here, the relative rise in the high school graduation rate in Regent Park beginning in 2001 is apparent.

The break in trend for Rexdale/LH graduation rates also corresponds to the introduction of Pathways. High school graduation rates at Rexdale/LH closely follow the graduation rates for the comparison projects from

²² Another 13.5 percent remained in TDSB the following year, 7.4 percent transferred outside TDSB, and 40.5 percent dropped out.

TABLE 3
MONTHLY PARTICIPATION IN PATHWAYS MENTORING ACTIVITIES BY GRADE
AMONG STUDENTS REGISTERED FOR PATHWAYS FOR 2010

	October	November	December	February	March	April
A. Regent Park						
Grade 9:						
Fraction attending mentoring activities	.67	.44	.32	.46	.53	.52
Number of mentoring activities attended among active participants:						
25th percentile	1	1	1	1	2	1
50th percentile	1	1	1	2	3	2
75th percentile	2	2	1	3	4	3
Grade 10:						
Fraction attending mentoring activities	.39	.35	.19	.27	.34	.29
Number of mentoring activities attended among active participants:						
25th percentile	1	1	1	1	1	1
50th percentile	1	1	1	2	2	2
75th percentile	1	2	1	2	3	3
B. Rexdale/LH						
Grade 9:						
Fraction attending mentoring activities	.47	.43	.41	.43	.37	.40
Number of mentoring activities attended among active participants:						
25th percentile	1.5	1.5	1.5	1.5	1.5	1.5
50th percentile	3	3	1.5	3	1.5	3
75th percentile	4.5	3	1.5	4.5	3	4.5
Grade 10:						
Fraction attending mentoring activities	.47	.43	.34	.46	.35	.35
Number of mentoring activities attended among active participants:						
25th percentile	2	1.5	1	1.5	1.5	2
50th percentile	3	3	1	2.75	2	3
75th percentile	3	3	3	3	2	3

NOTE.—Panel A reports monthly per-grade measures of participation in Pathways mentoring activities for students registered for Pathways in Regent Park for the 2010 academic year. Panel B reports the same for students registered for Pathways in Rexdale/LH for the 2010 academic year.

2000 to 2006 and then jump from 49.0 percent to 64.6 percent in 2007, when the program was introduced. The graduation rate declines slightly for the 2008 cohort. This could, in part, be due to the decline in Pathways' participation for this group. The overall patterns are similar using college enrollment outcomes in figures 3A and 3B.

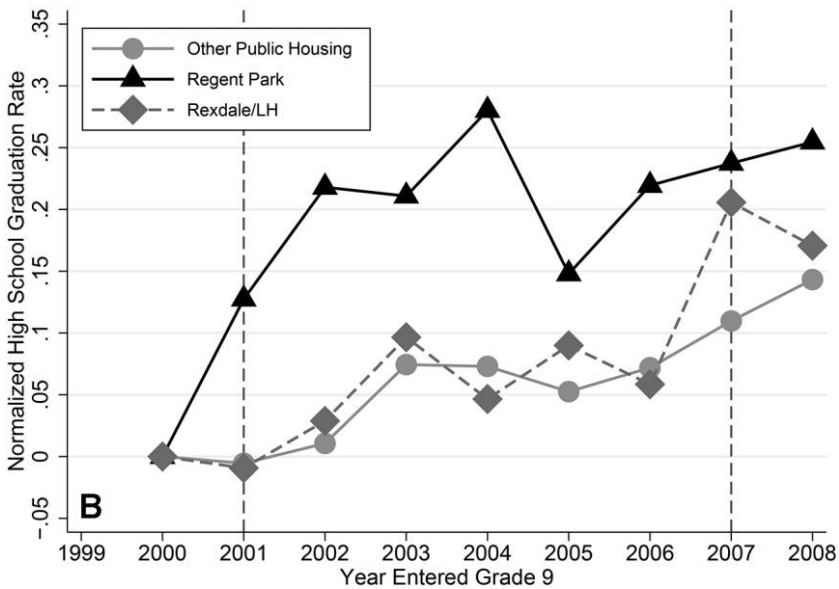
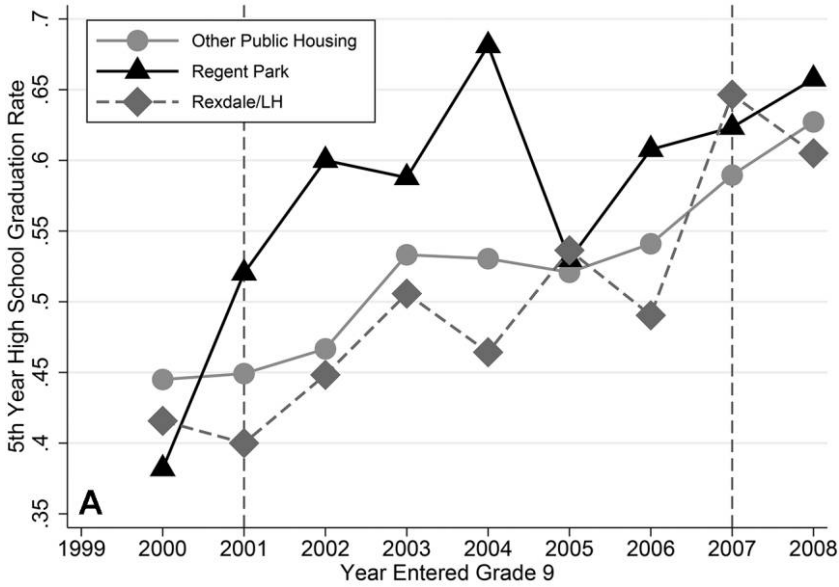


FIG. 2.—Fraction graduated from high school by fifth year among 2000–2008 grade 9 students from Pathways and non-Pathways housing projects. Panel A shows average 5-year high school graduation rates for students living in Toronto public housing who entered grade 9 between the 2000–2001 and 2008–9 academic years. Panel B shows the same information except that the high school graduation rate for each group for the 2000 cohort was subtracted from the actual rate for each cohort, leading to a baseline value of zero for all groups in 2000.

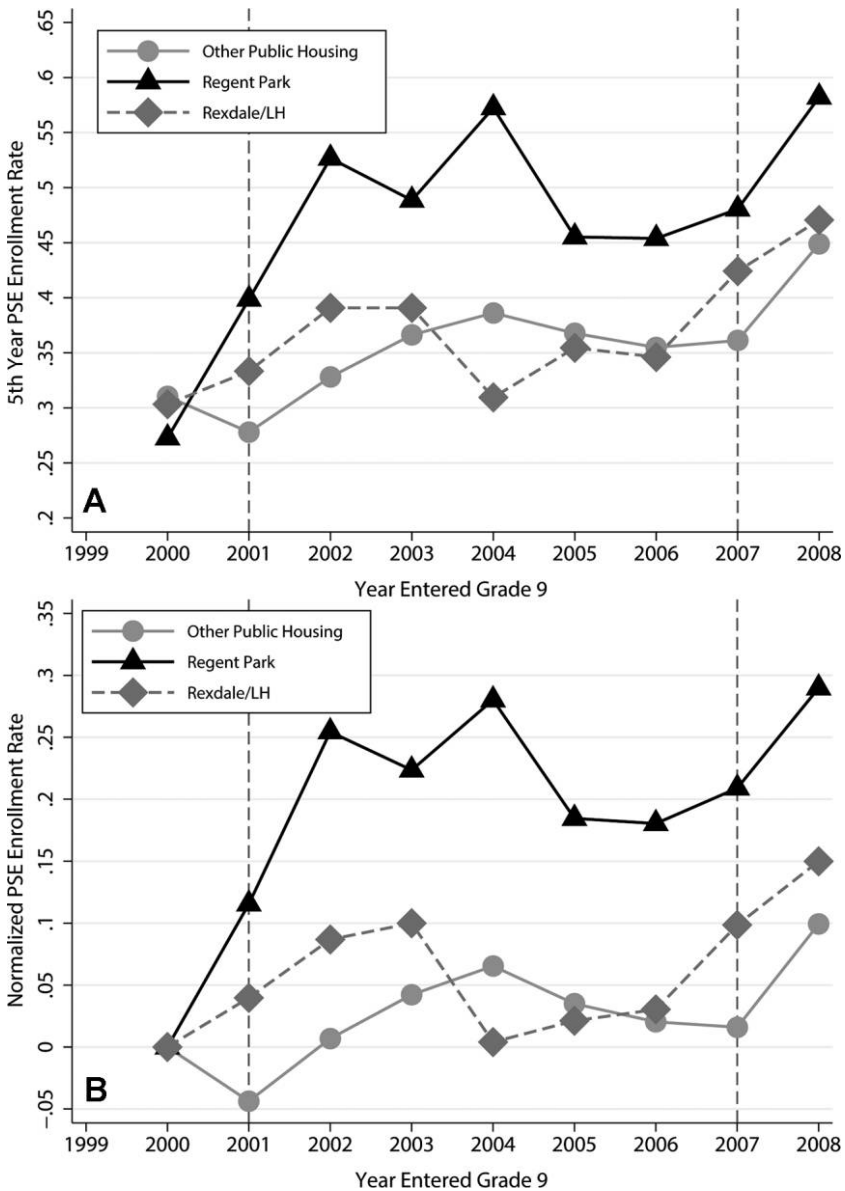


FIG. 3.—Fraction enrolled in college or university by end of fifth year for 2000–2008 grade 9 students from Pathways and non-Pathways Toronto public housing projects. Panel A shows average postsecondary enrollment rates after 5 years since starting high school for students living in Toronto public housing who entered grade 9 between the 2000–2001 and 2008–9 academic years. Panel B shows the same except that the postsecondary enrollment rate for each group for the 2000 cohort was subtracted from the actual rate for each cohort, leading to a baseline value of zero for all groups in 2000.

TABLE 4
 INTENT TO TREAT ESTIMATED EFFECTS OF PATHWAYS ON HIGH SCHOOL GRADUATION
 FOR VARIOUS SUBGROUPS BY END OF FIFTH YEAR SINCE STARTING HIGH SCHOOL

SUBGROUP	REGENT PARK (2000–2006)		REXDALE/LH (2001–8)	
	Pre-Pathways Mean (1)	ITT (2)	Pre-Pathways Mean (3)	ITT (4)
Full sample	.382	.153 [.020]***	.479	.058 [.019]***
Males	.35	.073 [.031]**	.434	.017 [.020]
Females	.412	.239 [.023]***	.526	.114 [.022]***
English 1st language	.119	.154 [.025]***	.426	.024 [.024]
English 2nd language	.472	.132 [.035]***	.528	.095 [.030]***
High grade 9 grades	.559	.136 [.026]***	.597	.072 [.016]***
Low grade 9 grades	.095	.076 [.025]***	.152	-.015 [.028]

NOTE.—Sample is the same as in table 1. Columns 1 and 3 report the Pre-Pathways means. Columns 2 and 4 report the corresponding estimated intent to treat (ITT) effect for eligible students living in Regent Park post-Pathways (students who enrolled in grade 9 in the 2001–2 to 2006–7 academic years) and the Lawrence Heights (LH) and Rexdale sites for the 2007–8 and 2008–9 academic years. All regressions include cohort (year) fixed effects and housing project fixed effects. Regressions in the first row include the following control variables: age (in grade 9), female, immigrant, and English as a second language. The regressions in rows 2–7 include the same control variables with the exception of the variable used to define the subsample of interest. Standard errors are clustered at the housing project level, and inference is based on the critical values of the t -distribution with $70 - 1 = 69$ degrees of freedom. Student immigrant status and first language are based on TDSB registration records.

* $p < .1$.

** $p < .05$.

*** $p < .01$.

B. Regression Analysis

Table 4 shows our estimated effects of Pathways eligibility on high school graduation for Regent Park and Rexdale/LH, both for the full sample and for various subgroups. Pathways eligibility effects (intent to treat [ITT]) are large for both Regent Park and Rexdale/LH. We estimate, with statistical significance at the 1 percent level, that the 2001 introduction of Pathways in Regent Park increased the 5-year graduation rate by 15.3 percentage points (from 44 percent to 59 percent), and the 2007 introduction in Rexdale/LH increased the graduation rate by 5.8 percentage points (from 52 percent to 58 percent).²³

²³ Similar estimates arise when using graduation after 6 years as the outcome variable (but with data from the 2000 and 2004 cohorts only). For Regent Park, Pathways eligibility increased 6-year high school graduation rates by 21.7 percentage points (from 38.2 to 59.9 percent; standard error 0.025). We also find separate eligibility effects for Rexdale (an

Table 4 also shows how these effects differ by student background. Pathways affects females significantly more than males, though both gender groups benefit. Our estimated Pathways impacts are similar by whether English is spoken at home. We also compare results for high- and low-achieving grade 9 students. While this variable is likely endogenous to Pathways eligibility (as we provide evidence for in table 6 below), the bias is downward for both subgroups. The results help shed light on possible dynamic complementarities.

Defining Pathways participation as ever signing up for the program, participation effects are 20–25 percent larger than eligibility effects. Online appendix table 2 shows these treatment on the treated (TOT) estimates using Pathways eligibility as an instrument for Pathways participation and the same difference-in-differences methodology as above. For the TOT effects to be valid, we must assume that nonparticipants are unaffected by Pathways and that no one is made worse off. Under these assumptions, Pathways led participants to a 19.1 and 7.5 percentage point increase in the 5-year high school graduation rates for Regent Park and Rexdale/LH, respectively. Online appendix table 2 also shows participation effects with participation defined as signing up for Pathways and attending at least one mentoring or tutoring session in grade 9 (only for the 2003, 2007, and 2008 cohorts for which we have data). Here the TOT effects are larger, especially for Rexdale/LH (a 9.5 percentage point treatment effect).

Pathways not only aims to help high-risk students graduate but also encourages postsecondary education. This is done by creating a college scholarship for each participant of up to \$4,000, college application assistance and fee waivers, and organized campus visits. Additionally, the program promotes college implicitly by helping improve grades (and eligibility) and through regular advising. Table 5 looks at postsecondary outcomes for Regent Park (panel A) and Rexdale/LH (panel B).²⁴ For Regent Park, we estimate very large impacts of Pathways eligibility on postsecondary enrollment. Application rates increase by 16.5 percentage points, up from a mean of 35.8 percent in Regent Park in 2000, leading to a 9.4 percentage point increase in the 2-year college enrollment among Pathways-eligible cohorts and a 9.2 percentage point increase in university program enrollment by the end of their fifth year. Similar to the graduation findings, impacts on postsecondary enrollment are significantly larger among females than males, though significant for both. For females, Pathways in Regent Park more than doubles college enrollment.

8.2 percentage point increase in high school graduation from a pre-Pathways mean of 45.4 percent) and Lawrence Heights (a 4.5 percentage point increase from a mean of 49.3 percent).

²⁴ Colleges in Canada are generally 2-year colleges focusing mainly on vocational programs. Universities offer 4-year programs that are more academic.

Moreover, Regent Park Pathways effects on postsecondary enrollment are large for both English and non-English home-speaking students and higher for students not initially failing their grade 9 English or math courses.

Panel B of table 5 shows the postsecondary program eligibility impacts for the new Pathways sites introduced in 2007. College and university application rates rise by about 9 percentage points (up from 45.0 percent) and 2-year college enrollment increases by 6.4 percentage points, with the impact concentrated among boys (a more than doubling of enrollment, from 10.4 to 22.3 percentage points). The estimated change in 4-year university enrollment is not statistically significant.

Finally, we estimate Pathways eligibility effects on some intermediate high school outcomes to explore possible mechanisms by which Pathways improves high school completion. Table 6 shows program eligibility effects on grade 9 math and English grades, grade 9 and 10 academic track status, OSSLT pass rates, and standardized grade 11–12 average grades. All four intermediate outcomes are significantly affected by Pathways' introduction, for either Regent Park or Rexdale/LH or both.

C. Alternative Comparison Groups

As a robustness check we consider alternative comparison groups to our baseline sample since some housing projects in our baseline sample are considerably smaller than Pathways projects and are located in different regions of Toronto. Although the application procedure is centralized and generic for all projects, applicants can specify region preferences or project-specific preferences (the default is an applicant's current census subdivision). Table 7 shows results from the same difference-in-differences methodology as in our baseline results, but with different comparison groups.

The first row of table 7 shows the baseline results for Pathways eligibility on high school attainment and postsecondary enrollment. The second row uses only the 11 largest housing projects for the comparison group, in addition to Regent and Rexdale/LH, which are all similar in size and notoriety.²⁵ Although the sample size drops by almost one-half, the effects remain large: about a 10.6 percentage point increase in high school graduation and a 14.2 percentage point increase in postsecondary enrollment. The third row uses only the two largest downtown projects in the same census subdivision as Regent Park. Here the point estimate for graduation is a 7.4 percentage point increase (standard error 8.2). The fourth

²⁵ The 11 large projects are Alexandra Park, Bleecker Street, East Mall, Edgeley Village, Jane Finch, Firgrove Crescent, Flemingdon Park, Lawrence Heights, Malvern, Moss Park, Pelham Park, Regent Park, Rexdale (Thistletown), and Warden Woods.

TABLE 5
ITT ESTIMATED EFFECTS OF PATHWAYS ON POSTSECONDARY EDUCATION (PSE) ENROLLMENT BY END OF FIFTH YEAR STARTING HIGH SCHOOL

SUBGROUP	OUTCOME VARIABLE							
	Applied to PSE		Enrolled in PSE		Enrolled in College		Enrolled in University	
	Pre-Pathways Mean (1)	ITT (2)	Pre-Pathways Mean (3)	ITT (4)	Pre-Pathways Mean (5)	ITT (6)	Pre-Pathways Mean (7)	ITT (8)
	A. Regent Park, 2000–2006							
Full sample	.358	.165 [.020]***	.273	.189 [.018]***	.097	.094 [.017]***	.176	.092 [.014]***
Males	.288	.146 [.029]***	.25	.132 [.024]***	.113	.06 [.022]***	.138	.072 [.022]***
Females	.424	.188 [.025]***	.294	.241 [.024]***	.082	.128 [.025]***	.212	.113 [.025]***
English 1st language	.024	.193 [.027]***	.024	.145 [.026]***	.024	.073 [.021]***	.000	.072 [.017]***
English 2nd language	.472	.145 [.035]***	.358	.188 [.036]***	.122	.116 [.028]***	.236	.071 [.031]**
High grade 9 grades	.52	.144 [.024]***	.402	.198 [.023]***	.137	.101 [.021]***	.265	.097 [.021]***
Low grade 9 grades	.095	.096 [.020]***	.063	.054 [.013]***	.032	.061 [.014]***	.032	-.007 [.007]

		B. Rexdale/LH, 2001-8					
Full sample	.450	.088 [.015]***	.355	.041 [.020]**	.126	.064 [.018]***	.229 [.018]
Males	.344	.124 [.022]***	.265	.102 [.035]***	.104	.119 [.016]***	.161 [.029]
Females	.560	.056 [.022]**	.448	-.030 [.019]	.149	-.005 [.024]	.299 [.028]
English 1st language	.366	.045 [.024]*	.287	.053 [.031]*	.113	.078 [.060]	.174 [.035]
English 2nd language	.528	.131 [.020]***	.418	.048 [.018]**	.138	.053 [.032]*	.280 [.043]
High grade 9 grades	.572	.086 [.018]***	.460	.030 [.026]	.154	.067 [.017]***	.306 [.028]
Low grade 9 grades	.110	.053 [.078]	.062	.043 [.051]	.048	.056 [.056]	.014 [.008]

NOTE.—Sample is all students who enrolled in grade 9 in a TDSB school between 2000 and 2006. Applied to PSE is a dummy variable equal to one if a student applied to at least one PSE institution in the province of Ontario in his or her final year of high school and equal to zero otherwise. Enrolled in PSE is a dummy variable equal to one if a student accepted an offer of admission to a (2-year) college or (4-year) university in Ontario upon completing high school and zero otherwise. Enrolled in college (university) is a dummy variable equal to one if a student accepted an offer of admission from a 2-year community college (university) in Ontario and zero otherwise. Columns 1, 3, 5, and 7 report the pre-Pathways means for Regent Park (students who enrolled in grade 9 in the 2000-2001 academic year). Columns 2, 4, 6, and 8 report the corresponding ITT effects for eligibility for Pathways. All regressions include cohort (year) fixed effects and housing project fixed effects. Regressions in the top row include the following control variables: age (in grade 9), female, immigrant, and English as a second language. The regressions in rows 2-7 include the same control variables with the exception of the variable used to define the subsample of interest. Standard errors are clustered at the housing project level, and inference is based on the critical values of the t -distribution with 70 - 1 = 69 degrees of freedom. Student immigrant status and first language are based on TDSB registration records.

* $p < .1$.

** $p < .05$.

*** $p < .01$.

TABLE 6
ITT ESTIMATED EFFECTS ON HIGH SCHOOL TEST SCORES AND ACADEMIC TRACK

INTERMEDIATE OUTCOME	REGENT PARK (2000–2006)		REXDALE/LH (2001–8)	
	Pre-Pathways Mean	ITT	Pre-Pathways Mean	ITT
Grade 9 English normalized score	-.115	.163 [.038]***	-.046	.036 [.037]
Grade 9 math normalized score	-.118	.192 [.043]***	-.106	-.056 [.091]
On academic track in grade 9	.533	.078 [.026]***	.487	.088 [.026]***
Grade 10 literacy test pass	.35	.016 [.021]	.439	.068 [.032]**
Grade 11–12 normalized score	-.066	.156 [.044]***	-.07	-.044 [.035]

NOTE.—All ITT estimated effects are from regressions that include cohort (year) fixed effects and housing project fixed effects. Grade 9 English and math grades are based on course grades in which students are assigned an achievement level of 0 to 4: 0 corresponds to a grade below 50 percent (i.e., failed the course), 1 corresponds to a course grade between 50 and 59 percent, 2 corresponds to a grade between 60 and 69 percent, 3 corresponds to a grade between 70 and 79 percent, and 4 corresponds to a grade of 80 percent or higher. For each cohort of grade 9 students we standardize these variables to have a mean of zero and a standard deviation of one. Average grade 11 and 12 grades are based on the average marks for all grade 11 and 12 courses taken and standardized as described above. On academic track in grade 9 is a dummy variable equal to one if the student is enrolled in “academic stream” courses and zero otherwise. Academic stream courses prepare high school students for university, applied stream courses prepare students for community college, and essentials stream courses prepare students to enter the labor force after high school. Grade 10 literacy pass is an indicator variable equal to one if a student has passed the OSSLT, a requirement for graduation in the Province of Ontario. All specifications include the following control variables: age (in grade 9), female, immigrant, and English as a second language. Standard errors are clustered at the housing project level, and inference is based on the critical values of the *t*-distribution with 70 – 1 = 69 degrees of freedom. Student immigrant status and first language are based on TDSB registration records.

* $p < .1$.

** $p < .05$.

*** $p < .01$.

and fifth rows show that similar effects are obtained when the sample is restricted to students from Pathways sites (row 4) and to students within Toronto’s so-called “priority neighborhoods,” which are areas with particularly concentrated levels of crime and poverty (row 5).

The baseline results use one year of preprogram data. This prevents us from considering whether the increase in education attainment between 2000 and 2002 for Regent Park was caused by an unusual trend that began prior to 2000. We also cannot tell whether the performance for the Regent Park grade 9 cohort in 2000 was unusually poor compared to prior years. To explore these possibilities, we obtained data for grade 9 cohorts in 1999 for youths from Toronto before its amalgamation of four subdivisions. The sample size drops to 1,916 students entering grade 9 between

TABLE 7
ITT ESTIMATED EFFECTS FOR PATHWAYS TO EDUCATION PROGRAM
USING ALTERNATIVE COMPARISON GROUPS

COMPARISON PROJECTS	REGENT PARK (2000–2006)			REXDALE/LH (2001–8)		
	Graduated by 5th Year	Enrolled in PSE by 5th Year	Sample Size	Graduated by 5th Year	Enrolled in PSE by 5th Year	Sample Size
All (baseline)	.153 [.020]***	.186 [.018]***	5,847	.058 [.019]***	.041 [.020]**	6,907
Large-density projects	.106 [.019]***	.142 [.018]***	2,942	.063 [.022]**	.03 [.021]	3,414
Large downtown projects	.074 [.082]	.135 [.192]	1,250	.087 [.022]**	.045 [.025]	2,207
Only Pathways sites	.138 [.023]**	.152 [.018]**	1,632	.084 [.019]**	.032 [.017]	1,896
Priority neighborhoods	.128 [.021]***	.171 [.019]***	2,468	.065 [.027]**	.026 [.020]	3,871
Legacy Toronto projects (1999–2006)	.09 [.046]*	.127 [.052]**	1,916	Not in legacy Toronto		

NOTE.—The baseline sample is the same as in table 4. For row 2, large-density housing projects include Alexandra Park, Bleecker Street, East Mall, Edgeley Village, Jane Finch, Firgrove Crescent, Flemingdon Park, Lawrence Heights, Malvern, Moss Park, Pelham Park, Regent Park, Rexdale (Thistletown), and Warden Woods. For row 3, large downtown projects include only Alexandra Park, Bleecker Street, and Regent Park. For row 4, the current and future Pathways sites include Regent Park, Rexdale (Thistletown), and Lawrence Heights. There are 11 housing projects that fall within the designated “priority neighborhoods” (row 5). They are Rexdale (Thistletown), Scarlettwoods, Duncanwoods Drive, Pelham Park, Lawrence Heights, McCowan Road, Edgeley Village, Firgrove Crescent, Flemington Park, Yorkwoods Village, and “other.” Other refers to a group of small housing projects that are grouped together to create a publicly available data set. For row 6, the other housing projects in legacy Toronto (before amalgamation) are Alexandra Park, Blake Street, Bleecker Street, Don Mount Court, Edgewood Avenue, Greenwood Park, and Pelham Park. The sample in row 6 includes students living in postal codes that may include mixed housing. All specifications include cohort (year) and housing project fixed effects and the following control variables: age (in grade 9), female, immigrant, and English as a second language. Standard errors are clustered at the housing project level, and inference is based on the critical values of the t -distribution with $70 - 1 = 69$ degrees of freedom. Student immigrant status and first language are based on TDSB registration records.

* $p < .1$.

** $p < .05$.

*** $p < .01$.

1999 and 2006 in Regent Park and seven other housing projects in the legacy City of Toronto (which does not include Rexdale or Lawrence Heights).²⁶ Appendix figures A1A and A1B plot the corresponding 5-year high school completion and postsecondary enrollment rates, respectively,

²⁶ To increase sample size, we match the TDSB sample to postal code addresses that include public housing projects but may also include close-by private residences. Estimated effects from the sample of postal codes that match uniquely to public housing addresses are similar but noisier.

normalized around the group means between 1999 and 2000. The 1999 Regent Park completion and enrollment rates are not unusually lower or higher than the 2000 rates. The last row of table 7 shows the corresponding estimated Pathways eligibility effect on high school graduation of 9.0 percentage points, though the estimate is less precise than the baseline estimate. The estimated impact on postsecondary enrollment is 12.7 percentage points. We conclude that the large estimated gains to education attainment from the Pathways program are relatively insensitive to a wide range of alternative (and smaller) samples.²⁷

V. Discussion of Mechanisms through Which Pathways May Be Working

Results from the previous section suggest that Pathways significantly improved key long-term student outcomes. Using mediation analysis, staff interviews, and earlier research, this section discusses possible mechanisms underlying these improvements. Understanding them more could help contain costs, lead to better theories of change, and increase effectiveness.

A. Mediation Analysis

We begin by presenting a mediation analysis (Heckman and Pinto 2015). The aim is to determine the extent to which the estimated increase in high school graduation and postsecondary enrollment rates, attributed to eligibility for Pathways, is due to improvements in intermediate outcomes. Our intermediate outcomes (potential mediators), indexed by j , are a student's standardized course grade in grade 9 math, standardized course grade in grade 9 English, standardized grade point average (GPA) across all courses in grades 11 and 12, likelihood of taking academic track (university preparation) courses, and likelihood of passing the OSSLT. Additional details on the mediation analysis are provided in online appendix E.

Following Heckman et al. (2013) and Heckman and Pinto (2015), we assume that long-term outcomes (y_i) are a linear function of the intermediate outcomes (mediators) (θ_i^j) and student demographic characteris-

²⁷ As a test for spillovers, we ran a difference-in-differences regression comparing the achievement of non-Pathways-eligible public housing students for those who attended the three schools with a large number of Pathways students to the achievement of those who attended other schools. Estimates for the effect of Pathways on noneligible students suggest a potentially large spillover effect (a 6.2 percentage point increase in high school completion), although standard errors are too high for causal inference (the standard error is 7.3 percentage points). Further, given that less than 20 percent of students in the three schools are Pathways students, large spillover effects seem unlikely. Overall, we conclude that evidence of spillover effects is inconclusive.

tics (X_i). The production function that maps student characteristics and mediators into long-term outcomes can be written as

$$y_i = \beta^{\text{residual}} T_{p(i)c(i)} + \sum_j \alpha^j \theta_i^j + \delta' X_i + e_{p(i)} + e_{c(i)} + e_i. \quad (2)$$

In this model, β^{residual} captures the component of the estimated Pathways eligibility effect that is not explained by improvements in intermediate outcomes. Mediators affect long-term outcomes if they themselves are affected by eligibility for Pathways and if they influence long-term outcomes (i.e., the coefficients $\alpha^j \neq 0$). Table 6 shows that the mediators are positively affected by Pathways.

Table 8 shows that each of these mediators positively affects 5-year high school graduation and postsecondary enrollment rates. For example, a one standard deviation increase in a student's grade 9 math grade increases the likelihood of graduating from high school within 5 years by approximately 3 percentage points and the likelihood of enrolling in a postsecondary program by 4 percentage points. Taking academic track courses and having a higher GPA in grades 11 and 12 have the largest effect on long-term outcomes. A one standard deviation increase in a student's GPA in grades 11 and 12 increases the likelihood of graduating from high school by more than 27 percentage points and increases the likelihood of enrolling in a postsecondary program by 20 percentage points, on average. Intuitively, intermediate outcomes measured early in a student's high school career are not highly predictive of longer-term outcomes once mediators measured later in high school, such as grade 11 and 12 GPA, are accounted for. These estimates are remarkably stable when looking at the effect of eligibility for Pathways at the Regent Park site only (cols. 1 and 2), the Rexdale/LH sites only (cols. 3 and 4), and all Pathways sites (cols. 5 and 6).

Online appendix E discusses how estimates of the coefficients reported in table 8 likely overestimate the causal effect of these mediators in producing long-term outcomes. In particular, eligibility for Pathways may improve unmeasured inputs, such as self-regulation, persistence, and positive identities. If these unmeasured inputs (*a*) determine long-term outcomes independently of improvements in grades and (*b*) are (positively) correlated with our measured mediators, then estimates for α^j will capture improvements in these inputs as well.

With this in mind, we proceed to estimate the share of the treatment effect (eligibility for Pathways) that is due to improvements in course grades, taking academic track classes, and passing the OSSLT and the part due to other factors. Figures 4A and 4B summarize this evidence.²⁸

²⁸ Following the literature, figs. 4A and 4B do not report shares for mediators that are both negative and statistically insignificant. This is the case for grade 9 math and grade 11–12 GPA at the Rexdale/LH sites.

TABLE 8
 MEDIATION ANALYSIS FOR 5-YEAR HIGH SCHOOL GRADUATION
 AND POSTSECONDARY ENROLLMENT OUTCOMES

	REGENT PARK (2000–2006)		REXDALE/LH (2001–8)		ALL PATHWAYS SITES (2000–2008)	
	5-Year High School Graduation (1)	PSE (2)	5-Year High School Graduation (3)	PSE (4)	5-Year High School Graduation (5)	PSE (6)
Pathways eligibility	.07 [.038]*	.132 [.045]***	.067 [.032]**	.042 [.036]	.062 [.024]**	.074 [.028]***
Grade 9 English grade	.045 [.007]***	.026 [.007]***	.038 [.006]***	.031 [.007]***	.04 [.006]***	.028 [.006]***
Grade 9 math grade	.035 [.006]***	.04 [.007]***	.024 [.006]***	.034 [.006]***	.03 [.005]***	.038 [.006]***
On academic track	.046 [.012]***	.134 [.014]***	.037 [.011]***	.134 [.013]***	.044 [.010]***	.136 [.012]***
Grade 10 literacy test	.028 [.013]**	.08 [.015]***	.042 [.011]***	.063 [.013]***	.029 [.011]***	.066 [.012]***
Grade 11–12 normalized GPA	.274 [.006]***	.201 [.007]***	.285 [.006]***	.207 [.007]***	.281 [.005]***	.206 [.006]***

NOTE.—Sample is all TDSB public housing students for the relevant entering grade 9 cohorts with a nonmissing grade 11–12 GPA. The sample in cols. 1 and 2 is all entering grade 9 cohorts between 2000 and 2006. For cols. 3 and 4, the sample is all entering grade 9 cohorts between 2001 and 2008. For cols. 5 and 6, the sample is all entering grade 9 cohorts between 2000 and 2008. Row 1 reports the coefficient estimate for the effect of Pathways eligibility on the 5-year high school graduation rate (cols. 1, 3, and 5) and postsecondary enrollment (cols. 2, 4, and 6) in a regression that includes intermediate outcomes as independent variables. Rows 2–6 report coefficient estimates for the effect of the relevant intermediate outcome (mediator) on the 5-year high school graduation rate or postsecondary enrollment. All specifications include the following controls: a gender dummy, the age of the student upon enrolling in a TDSB high school, immigrant status, and a dummy for whether English is the primary language spoken at home. Student immigrant status and first language are based on TDSB registration records. Standard errors are clustered at the housing project level, and inference is based on the critical values of the t -distribution with $70 - 1 = 69$ degrees of freedom.

* $p < .1$.

** $p < .05$.

*** $p < .01$.

Even though eligibility for Pathways increases both grade 9 math and English grades, especially at the Regent Park site, these improvements explain relatively little of the overall treatment effect because the coefficients α^j for these intermediate outcomes are small. The increase in the likelihood of taking academic track courses explains approximately 5 percent of the high school graduation treatment effect and between 6 and 23 percent of the postsecondary enrollment treatment effect.

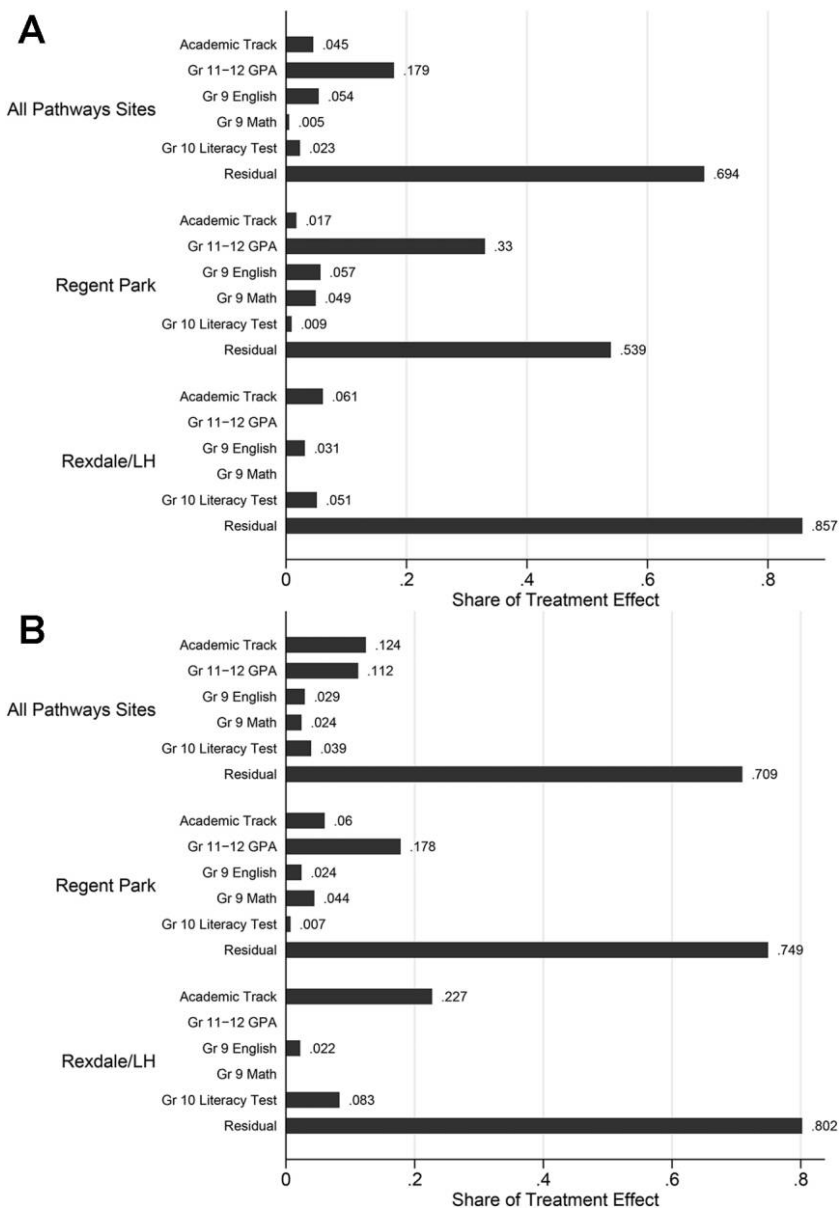


FIG. 4.—Fraction of Pathways eligibility treatment effect explained by intermediate outcomes. Panel A shows the fraction of the Pathways eligibility treatment effect on 5-year high school completion rates explained by improvements in intermediate outcomes. Panel B shows the fraction of the Pathways eligibility treatment effect on postsecondary enrollment rates explained by improvements in intermediate outcomes.

Not surprisingly, taking academic track courses has more explanatory power for the postsecondary enrollment outcome (table 8, row 4). Higher grade 11 and 12 grades explain up to 20 percent of the estimated treatment effect at the Regent Park site, with more explanatory power for high school graduation than for postsecondary enrollment. In unreported results, we also find that improvements in course grades and increased likelihood of taking academic track courses explain a large fraction of the Pathways treatment effect on (4-year) university enrollment. In contrast, these intermediate academic outcomes are less important in explaining the increase in (2-year) college enrollment.

Across all Pathways sites, the unexplained portion of the estimated effect of Pathways is at least 55 percent for both long-term outcomes. Averaging across the Regent Park and Rexdale/LH sites, 70 percent of the estimated treatment effect for both high school graduation and postsecondary enrollment is unexplained by improvements in course grades and the increased likelihood of taking academic courses (top panel of figs. 4A and 4B). This is consistent with nonacademic components of the program—such as the one-on-one meeting with SPSWs, assistance with postsecondary and job applications, and group mentoring activities—playing a key role in improving student outcomes.

B. Staff Interviews

The staff we spoke with did not attribute the program's success to any one component.²⁹ Many of them emphasized the importance of operating within the housing project community as an advantage for establishing strong ties among residents. One SPSW, for example, remarked that "Pathways has become just something you do if you live in Regent Park and you're going to high school."

Several staff members feel that Pathways plays a paternalistic role, providing support and encouragement to students not receiving enough at home. One staff member said,

Our approach is just about "you know what? I see you, I hear you, I love you." Maybe it's not the same kind of love you get from your parent but I do love you because I'm seeing you year after year for 4, 5, 6, sometimes 7 years. We have kids in this program whose primary relationship could be an SPSW or could be a mentor. Could be a tutor who is a volunteer. That's the kind of basic technology that we're using here that seems to work which is centering that kid in all her complexity and saying, "it's going to be OK—you have the resilience to do it."

²⁹ Online app. C presents more detailed discussions with Pathways staff.

Fostering positive interactions with fellow students was also mentioned as a way through which Pathways develops more mature social identities: “I watched students lead completely closed off, non-successful, zero self-esteem, to all of a sudden having peers that they could identify with, they could be themselves with. I saw them smiling, laughing, talking, earning credits, working with teachers. So for me it was a really great reminder that the school system really fails a lot of students and how well those students can do with a little extra attention and positive space, and a really safe place to go to school.”

One clear consensus that did emerge concerns the importance of financial incentives for encouraging participation. Staff mentioned that bus tickets, in particular, get students to regularly meet with SPSWs. In turn, SPSWs remind students to regularly utilize the program’s other services: “Students know us as mostly helping them with bus tickets, but then all the other things just fall into place.” Some SPSWs even make students pick up bus tickets twice a week unless they attend tutoring or mentoring services more frequently.

The program does not help all students equally. Estimates are larger among students with higher initial measured abilities (which we proxy with grade 9 math and English performance). This suggests dynamic complementarities in human capital formation, in line with earlier evidence suggesting that better-prepared students are more able to benefit from additional investment. In the context of Pathways, students disengaged from school are not easy to help. One SPSW commented, “students that we don’t—can’t support well are those that are not interested in school.” Another said, “If a student’s focus is not academics we lose them. . . . I think the students who are most successful are the ones who were able to hear out what somebody is saying, take some of that in, like some of the suggestions.” Reasons behind disengagement may go well beyond lack of motivation. Staff mentioned mental health problems and stressful situations at home such as pregnancy, unemployment, sexual and physical assault, marital tensions, and unsupportive parents as other serious obstacles that many Regent Park students experience.

C. Common Features with Other Successful Programs

Our interviews with Pathways staff suggest that components of the program that aim to support students beyond improving academic outcomes, especially the student-SPSW relationship, play an important role. The large component of the Pathways treatment effect that is not explained by improvements in course grades is consistent with this. Recent research also finds evidence of large impacts for interventions that provide personalized assistance and mentoring for adolescents and young

adults. Bettinger and Baker (2014) show that personalized and regular coaching increases persistence for college students. Assistance with college transition and applications, including paying application fees, can markedly increase college enrollment (Bettinger et al. 2012; Carrell and Sacerdote 2013).

The Accelerated Study in Associate Program, a comprehensive intervention designed to increase 2-year college completion rates for low-income community college students, features many of the same components as Pathways. Students who are randomly selected into the program receive free public transportation tickets, mandatory tutoring, regular counseling over multiple years, and career advising services. Recent results from this program include a doubling of the 3-year graduation rate (40.1 vs. 21.8 percent) and a 45 percent increase in 4-year college enrollment (25.1 vs. 17.3 percent; Scrivener et al. 2015). A randomized trial in Chicago provided social-cognitive skills training, along with mandatory daily two-on-one tutoring, to improve disadvantaged youths' social interaction skills and self-regulation. The program generated large improvements in school engagement, math, and reading; these effect sizes are some of the largest in the literature (Cook et al. 2014). The Quantum Opportunity Program also offered a range of social, community, and educational after-school services to disadvantaged high school students. The program increased on-time high school graduation and college enrollment, though, likely because of lower participation rates, the program had smaller effects than Pathways (Rodriguez-Planas 2012).

College scholarship incentives, similar to those offered by Pathways, have also been found effective. A study in New Brunswick that randomly offered entering grade 9 students college trust funds that accumulated by \$2,000 each year in high school, up to a maximum of \$8,000—double Pathways' incentive—reduced dropout rates by about 8 percentage points and increased postsecondary enrollment rates by about 10 percentage points (Ford et al. 2012). A program that offered an entire sixth-grade class full college financial support, along with academic and social support, led to a near doubling of high school graduation rates, from roughly 35 to 70 percent (Kahne and Bailey 1999).

As discussed earlier, tutoring, after-school assistance, and a culture of high expectations are key parts to highly effective chartered schools (Dobbie and Fryer 2013). We found that participation in tutoring and mentoring activity is sporadic for some students. Less than half the students in Regent Park, for example, attended any tutoring sessions in October after grade 9 or attended any group mentoring session during any given month. We suspect, therefore, that the impacts from the program are coming more from regular interactions with SPSWs than from access to tutoring or mentor programming. There may be opportunities for encouraging further participation in these areas.

VI. Conclusion

Pathways to Education is a comprehensive youth support program developed to improve academic outcomes among those entering high school from very poor social-economic backgrounds. The program includes proactive case workers assigned to each student, free weekly tutoring and group activities, career counseling, college transition assistance, and immediate and long-term financial incentives. The program is community based and attempts to address the poor academic performance from three of Toronto's largest public housing complexes. Since its start in 2001, Pathways has attracted national public and media interest. An internal 2007 consulting report concluded that "Pathways is one of the most successful programs we have found anywhere in North America." The program has recently been expanded to 11 other communities across Canada, and expansion efforts continue. About half its financial support (47 percent) comes from national, provincial, and local levels of government. The other half comes from a considerable foundation (20 percent), corporate (19 percent), individual (8 percent), and other (6 percent) support.

This paper attempts to evaluate Pathways and explore whether impacts were replicated at expansion sites. Overall, our findings suggest that Pathways has an impressive effect on youths:

- Pathways reaches a remarkably high fraction of its target group: 80–95 percent of eligible students entering high school and their parents register in writing for the program.
- At the program's initial site (Regent Park), fifth-year high school graduation rates increased from 44 percent to 59 percent, while fifth-year postsecondary enrollment rates rose from 31 percent to 50 percent.
- The program's 2007 expansion at two other sites also led to impressive gains: an immediate 6 percentage point increase in high school graduation and about a 12 percentage point increase in postsecondary enrollment for males.
- Effects are larger for girls and for students not failing grade 9 math and English classes. Impacts are similar for students with English and non-English languages spoken at home.
- Program effects are positive for most of the limited intermediate outcomes we explore: grade 9 math and English grades, taking academic track courses, and grade 11 and 12 marks.

Pathways costs approximately \$3,500 per student-year in 2010 Canadian dollars, along with \$1,200 per student-year in head office administrative costs (Boston Consulting Group 2011). Direct operating costs comprise 20 percent for public transportation tickets, 15 percent for scholarship

expenditures, and 65 percent toward SPSWs, tutoring, and group activity operations. On one hand, the average cost for a participant's high school tenure is estimated at \$13,400 in present value direct operating costs, plus indirect administrative costs and costs from extended enrollment in school. On the other hand, lifetime benefits from Pathways are large. Using a financial return to high school completion of 20 percent and a return to enrolling in college for marginal students of 22 percent (Oreopoulos and Petronijevic 2013), the benefit-to-cost ratio from Pathways eligibility across all sites is 3.92.³⁰ For the Rexdale/LH expansion sites, the smaller estimated treatment effects make the benefit-to-cost ratio depend more on the discount rate, but, in general, benefits exceed costs. Including the many possible nonpecuniary benefits from additional schooling (Oreopoulos and Salvanes 2011), reductions in social assistance payments, and social benefits from reduced crime and improvements to health (Lochner 2011) would provide further support for maintaining or extending the program.

We demonstrate that Pathways generates large improvements in student outcomes. However, it is not possible with the methodology employed here to determine whether these results rely on a few components of the program or whether program integration is crucial. Being able to experiment with variations of the program or further qualitative research through survey and ethnographic research may help. The expansion of additional Pathways sites outside of Toronto also provides an opportunity to test whether these initial impacts can be replicated. Implementation quality, community support, recruitment, communication efforts, and target population may be key underlying ingredients for the program's effectiveness that could explain why some site impacts are larger than others. Still, the program's initial sites were highly effective in improving education attainment for a sample of very poor youths. These results are promising, similar to recent intensive efforts to target disadvantaged youths, and point to the need for further research and policy discussion.

³⁰ See online app. F for more details.

Appendix

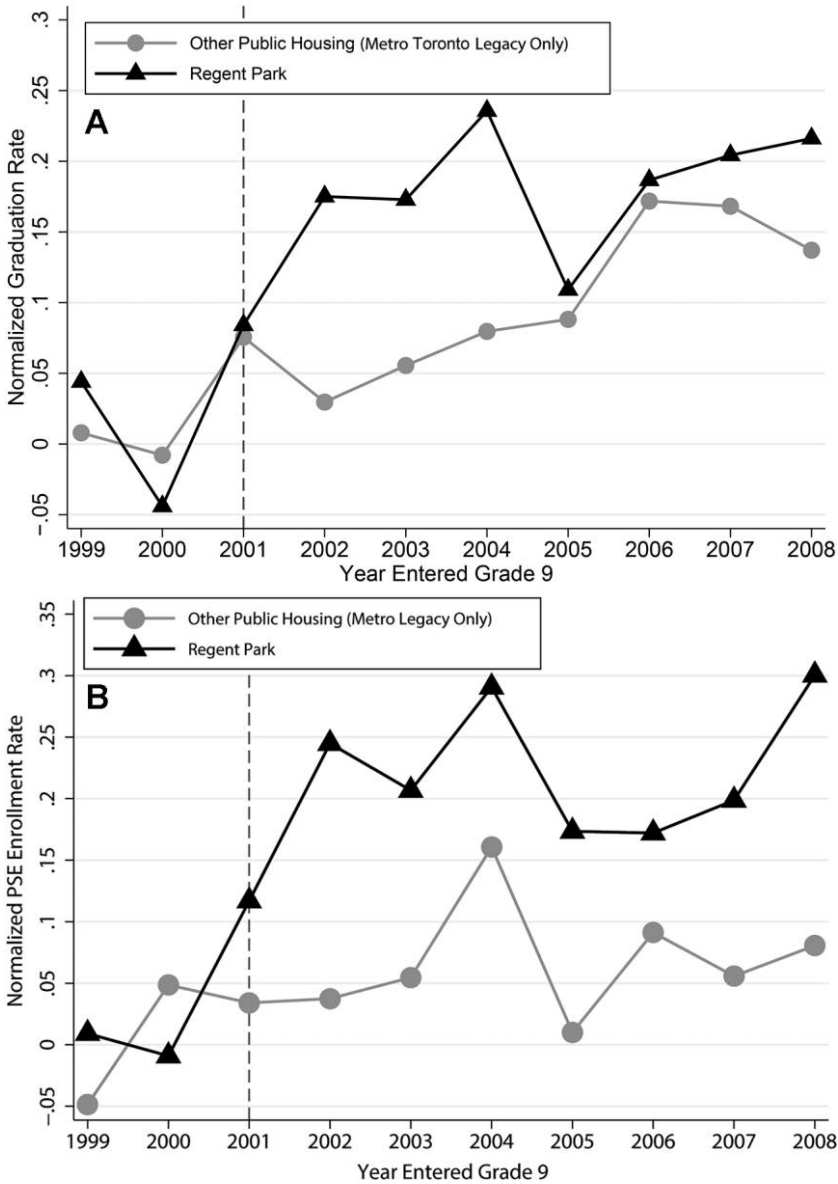


FIG. A1.—Normalized fraction graduated from high school and enrolled in postsecondary education by the end of fifth year among 1999–2006 grade 9 students from Regent Park and other public housing projects in preagglomeration Toronto. Panel A shows high school completion rates after 5 years since starting high school for students living in Toronto public housing who entered grade 9 between the 1999–2000 and 2008–9 academic years, normalized around the group mean rate between the 1999 and 2000 cohorts. Panel B shows the same information except that the outcome is postsecondary enrollment rates.

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