Students' School Preferences and Outcomes: Evidence from Admission Lotteries

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Abstract

School choice may improve student-school matches but may also increase segregation. Using administrative and survey data from Amsterdam, we study whether attending a preferred secondary school improves a comprehensive set of academic and non-academic outcomes. Exploiting admission lotteries in the city's matching system, we compare students who win or lose access to their preferred schools. Lottery losers attend schools with more disadvantaged, more diverse peers and lower value added measures. Yet we find no evidence that preferred-school attendance improves outcomes. Students assigned to less preferred schools show greater social civic engagement, underscoring school assignment's role in social integration.*JEL*-codes: I21, I24, C26.

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1 Introduction

School assignment mechanisms are designed to give students access to schools they prefer. This reflects the widely held view that attending a preferred school improves student outcomes. At the same time, there is the concern that school choice contributes to segregation across schools along socioeconomic and ethnic dimensions (e.g., Stoica and Flache, 2014; Burgess et al., 2015; Oosterbeek et al., 2021). Whether the emphasis on preferences improves student outcomes sufficiently to justify its consequences for segregation, remains an open question. The evidence of the effects of school choice on academic outcomes is mixed while the evidence regarding non-academic outcomes points to favorable effects but often focuses on outcomes that seem of lesser importance in many settings, such as arrest rates and teen motherhood.[1]

This paper estimates the causal effects of attending a preferred school on a wide range of academic and non-academic outcomes. We use data from the centralized secondary-school assignment system in Amsterdam, which uses a student-proposing deferred acceptance (DA) mechanism. Because ties between students with the same priorities are resolved by lottery, assignment to a student's first-ranked school is effectively random within well-defined groups of applicants. This setting allows us to compare students who win and lose admission lotteries and thereby identify the causal effect of attending a preferred school.

We combine administrative register data with data from a unique survey that targeted all secondary-school students who participated in the match. The administrative data allow us to examine academic outcomes including grade progression, field specialization, exam performance, and university enrollment. The survey data allow us to examine a wide range of non-academic outcomes that are central to families' school preferences but are not observed in administrative data. These include school satisfaction, attitudes toward school, parental involvement, behavior, political and social civic engagement, friendships, and personality traits.

In the Netherlands, students transitioning from primary to secondary school are directed to one of four ability tracks by their primary school teacher. Around one in four students in the more academic university track are not assigned to their first-ranked school. Because of this and because response to our survey is highest among students in this track, our analysis focuses on the university track. Approximately 25% of Amsterdam's secondary-school students are enrolled in that track. Because there are basically no private schools in the Netherlands, compliance with the school assignment from the match is close to perfect.

Students who lose the admission lottery attend schools with systematically different characteristics from those attended by lottery winners. They are more likely to enroll in schools where

[1]Studies that find positive impacts on academic outcomes include Jackson (2010), Pop-Eleches and Urquiola (2013) and Dobbie and Fryer (2014). Studies finding zero or even negative impacts include Cullen et al. (2006); Clark (2010); Lucas and Mbiti (2014); Abdulkadiroğlu et al. (2014); Angrist and Rokkanen (2015); Abdulkadiroğlu et al. (2018); Barrow et al. (2020); Wu et al. (2019) and Oosterbeek et al. (2023). Studies reporting effects on crime and teen motherhood include Cullen et al. (2006); Deming (2011) and Beuermann et al. (2023).

students have lower prior achievement and come more often from disadvantaged socioeconomic backgrounds. These schools are also more socioeconomically and ethnically diverse and tend to perform worse on conventional value added measures. In addition, lottery losers attend schools that are farther from home and have fewer former primary-school classmates than the schools attended by lottery winners. Despite these differences, we find no evidence that attending a preferred school improves academic outcomes. Lottery losers and winners are equally likely to graduate from the university track on time and to enroll in university. There are also no differences in overall GPA and in exam grades for mathematics and Dutch. If anything, lottery losers even do somewhat better than lottery winners. They are three percentage points more likely to specialize in the more challenging science or health fields as opposed to social sciences and humanities. They also have significantly higher final exam grades for English language than lottery winners.

The main contribution of this paper is the wide range of non-academic outcomes that we consider. Do – in the absence of effects on academic outcomes – effects on non-academic outcomes justify the emphasis on students' preferences for school assignment? For almost all of these outcomes, we find no statistically significant differences between lottery losers and winners. Both groups provide very similar responses regarding attitudes towards school, parents' awareness, behavior inside and outside school, school satisfaction, personality traits, and friendships. The main exception is that students who are not admitted to their preferred school exhibit higher levels of social civic engagement, capturing appreciation of diversity, support for redistribution, and respect for others' opinions. These findings are consistent with the hypothesis that exposure to more diverse peer environments influences social attitudes.

These results challenge the view that attending a preferred school improves student outcomes. While students and parents express strong preferences over schools, attending a more preferred school does not lead to better academic performance or improved outcomes across non-academic domains. At the same time, assignment to less preferred schools increases exposure to diverse peers and leads to higher levels of social civic engagement. These findings suggest that the benefits of prioritizing student preferences in school assignment are limited, while the consequences for school segregation are substantial. In the setting of the current study, Oosterbeek et al. (2021) document that 40% of school segregation by ethnicity and 25% of school segregation by household income can be attributed to heterogeneity of school preferences between students from different ethnic and social groups.[2]

This paper contributes to the literature on school choice, peer effects, and school assignment. First, we provide causal evidence on the effects of attending a preferred school using lottery-based assignment in a centralized matching mechanism. While previous work has focused primarily on academic outcomes, we examine a much broader set of non-academic outcomes that potentially influence school preferences (see the references in footnote 1). Second, our findings contribute to the literature on peer effects by showing that exposure to more diverse peers affects civic attitudes

[2]Ability tracking is the other main determinant of school segregation among secondary schools in Amsterdam.

without adversely affecting academic outcomes (Boisjoly et al., 2006; Rao, 2019). Third, our results inform the design of school assignment mechanisms by clarifying the consequences of prioritizing student preferences (Abdulkadiroğlu and Sönmez, 2003; Pathak and Sönmez, 2008).

This paper proceeds as follows. The next section describes the context. Section 3 describes the data. Section 4 provides details of the empirical approach. Section 5 presents results of the effects of losing the admission lottery on characteristics of school and peers. Section 6 presents and discusses the main findings. Section 7 concludes.

2 Context

2.1 Secondary education in the Netherlands

Students in the Netherlands typically transition from primary school to secondary school around the age of 12. At this stage, primary school teachers direct students to one of four ability tracks: the four-year vocational-elementary track, the four-year vocational-theory track, the five-year college track, or the six-year university track. The two vocational tracks prepare students for vocational programs, while the college track provides access to professional colleges. The university track grants access to university education, with most programs admitting all applicants who completed the university track.

Students can freely choose among the schools that offer their designated track. Schools do not accept students in a track above their level.[3] Some schools offer only one track while others offer multiple tracks.

Virtually all schools in the Netherlands are publicly funded and there are no tuition fees.[4] Schools with a large share of disadvantaged students receive additional government funding. Consequently, these schools have more resources than other schools. Schools are governed by independent boards and not by (local) government authorities, making them not too different from charter schools in the US. The Dutch Education Inspectorate assesses the quality of schools and publishes its findings online. Schools that receive the lowest quality score for three consecutive years are closed.

In the final years of secondary education, students specialize in one of four study fields: science, health, social sciences, or humanities. Science and health are considered more challenging fields, requiring math at a more advanced level. Secondary schools follow national curriculum guidelines, and all students take national exit exams at the end of secondary education. These exams count for half of the final grades, with the other half determined by school-specific exams taken in the last two or three years of secondary education.

[3]Students are allowed to enroll in a track below their level. In practice this does not happen.

[4]Public schools can request a voluntary contribution from parents. The amounts suggested for these contributions are around 300 euros per year. This makes it unlikely that choices are restricted by financial motives.

2.2 Secondary school choice in Amsterdam

Amsterdam is the largest city in the Netherlands, with approximately 7,500 students transferring annually from primary school to one of the city's 65 secondary schools. Since 2015, secondary schools in Amsterdam use the student-proposing DA mechanism to assign students to schools (Gale and Shapley, 1962).[5] Under this system, students submit a rank-ordered list (ROL) of their preferences for schools. The length of this ROL can be as long as the number of available schools. There are no default schools for students who submit a short ROL and are not assigned to a school on their ROL.[6] Because DA with unrestricted ROL length is strategy proof, it is optimal for students to submit a ROL according to their true preferences. This property is emphasized in communications to parents and students.[7]

There are only a few priority rules. These are based on having older siblings in the school, having a parent employed by the school, or a specific pedagogical relationship between the primary school a student attended and the secondary school on the student's ROL (Montessori, Dalton or Waldorf). The number of students with priority is quite small, as most schools have phased out priority for siblings and children of staff. Priority on the basis of home-school distances or test scores is not allowed. Ties between students with the same priority status (or no priority) are resolved by lottery numbers. Around 80% of applicants are assigned to their first-ranked school. This percentage varies by tracks, being higher in the vocational tracks (around 90%) and lower in the college and university tracks (around 75%).[8]

Despite the common public funding and the preparation of students for the same nationwide final exams, secondary schools in Amsterdam exhibit considerable differentiation across various dimensions. To illustrate this, Table 1 provides a description of the characteristics of the schools that offer the university track. The first column lists the pedagogical principles followed by each school. While most schools adhere to traditional pedagogical principles, nine out of 31 schools follow alternative pedagogies, such as Montessori, Dalton, or Waldorf. The next column indicates that seven out of 31 schools offer only the university track while the remaining schools also offer other tracks. The third column shows that 13 out of 31 schools subscribe to a religion, with three being Catholic, three Protestant, one Jewish, and six ecumenical. The final column lists the special

[5]Before 2015 (starting in 2005) the secondary schools in Amsterdam used a version of the adaptive Boston mechanism. See De Haan et al. (2023) for an analysis of the different allocations under the Boston and DA mechanisms in Amsterdam. Before 2005, school assignment was decentralized.

[6]These students are assigned to another school in Amsterdam with remaining capacity. Student who reject this assignment, can apply to one of the other schools with remaining capacity.

[7]Some recent studies point to the fact that students sometimes make dominated choices under strategy-proof mechanisms (e.g. Rees-Jones, 2018; Fack et al., 2019; Shorrer and Sóvágó, 2023). Fack et al. (2019) report that conditional on both preferences and priorities being private information, truth telling is the unique equilibrium if there are no application costs and uncertainty about admission outcomes is large. These requirements are satisfied in our setting, where application costs are basically zero and admission is in most cases based on lottery outcomes and not on test scores or home-school distances.

[8]Placement in top choices was lower in 2015 when multiple tie breaking was used, compared to after the switch to single tie breaking in 2016.

programs offered by the schools. Five schools are gymnasium schools, meaning that students are required to take exams in at least one of the languages ancient Greek and Latin. Five other schools offer these languages as optional subjects. Other schools offer specialized programs in arts, sport, technique, coding or languages. Only 13 out of the 31 schools do not offer any special program. When considering all four dimensions, 22 schools offer a unique combination of characteristics. Three groups of three schools each, share the same characteristics across the four dimensions.[9]

The schools also differ in the characteristics of their students and teachers, as well as in the academic outcomes of their students. Because the regulations of Statistics Netherlands prevent the reporting of school-specific statistics, we cannot include this information in Table 1. Instead, Table 2 reports measures of the variation of school characteristics across schools in Amsterdam offering the university track. The first column displays the mean values at the school level, while the next three columns present the standard deviations and the values at the first and ninth deciles. The school characteristics considered in this table are the shares of students of Dutch descent and from low-income families, the mean test score of students on the exit test from primary school, the shares of female teachers and teachers of Dutch descent, the share of students opting for the science and health specializations, the share of students who are on time and on track, the mean GPA on the nationwide final exam, and four value added measures.[10] The information in Table 2 reveals that there is considerable variation across schools in terms of student and teacher characteristics, as well as academic outcomes. For example, the share of students from Dutch descent is 8% at the first decile and 68% at the ninth decile. Similarly, the share of students specializing in the science or health tracks is 34% at the first decile and 60% at the ninth decile. The difference in final exam GPA between the first and ninth decile is almost a full point.

3 Data

3.1 Data sources

We use data from three sources: the secondary-school match in Amsterdam, register data from Statistics Netherlands, and the survey which we conducted among secondary-school students in Amsterdam.

Secondary-school match

The secondary-school match provides data of the six cohorts of students who participated in the match in Amsterdam between 2015 and 2020. For each student, there is information about assigned track, the ROL, priority status, actual placement, age, sex, the score on the nationwide exit test

[9]Table C1 in the appendix shows schools' capacities, the number of applicants and the numbers of students on waiting lists.

[10]In Appendix B we describe the construction of these variables in detail.

Table 1. Characteristics of schools offering the university track

School:	Educational philosophy (1)	Lower track(s) (2)	Religion (3)	Special programs (4)
Barlaeus Gymnasium	traditional	no	none	gymnasium
Berlage Lyceum	traditional	yes	none	bilingual
Caland 2/Lumion	traditional	yes	none	sports
Calandlyceum	traditional	yes	none	technasium
Cartesius 2/ALASCA	non-traditional	yes	none	none
Cartesius Lyceum	traditional/agora	yes	none	latin/greek
Christelijk Sgm Buitenveldert	traditional	yes	protestant	none
Comenius Lyceum	traditional	yes	ecumenical	none
Cygnus Gymnasium	traditional	no	ecumenical	gymnasium
Damstede Lyceum	traditional	yes	ecumenical	technasium
Fons Vitae Lyceum	traditional	yes	catholic	none
Geert Groote College	waldorf	yes	none	none
Gerrit van der Veen College	traditional	yes	ecumenical	dance/music
Hervormd Lyceum West	traditional	yes	protestant	none
Hervormd Lyceum Zuid	traditional	yes	protestant	none
Het 4E Gymnasium	traditional	no	none	gymnasium
Het Amsterdams Lyceum	traditional	no	none	english/spanish/italian latin/greek
Hyperion Lyceum	non-traditional	no	none	latin/greek
IJburg College/Terra Nova	traditional	yes	none	none
Joodse SG Maimonides	traditional	yes	jewish	none
Metis Montessori Lyceum	montessori	yes	none	technasium, coding
Montessori Lyceum Amsterdam	montessori	yes	none	latin/greek
OSB	traditional	yes	none	none
Pieter Nieuwland College	traditional	yes	ecumenical	art/science
Reigersbos/Ir Lely	traditional	yes	none	none
Spinoza Lyceum	dalton	yes	none	latin/greek, music
Spinoza20first	dalton	yes	none	none
St. Ignatiusgymnasium	traditional	no	catholic	gymnasium
St. Nicolaaslyceum	traditional	yes	catholic	sport, culture
Vinse School	Finnish	yes	ecumenical	none
Vossius Gymnasium	traditional	no	none	gymnasium

Table 2. Variation in school characteristics

	Mean	Std.dev.	1st decile	9th decile
	(1)	(2)	(3)	(4)
Share Dutch students	0.44	0.22	0.08	0.68
Share low-income students	0.43	0.18	0.23	0.69
Test score primary school (standardized)	0.38	0.52	-0.21	1.08
Share female teachers	0.55	0.05	0.48	0.62
Share Dutch teachers	0.65	0.11	0.54	0.77
Share in science or health track	0.48	0.10	0.34	0.60
Share exam on time and on track	0.56	0.13	0.42	0.77
Final exam GPA (1-10)	6.30	0.33	5.92	6.85
Final exam GPA (value added)	-0.12	0.21	-0.41	0.10
Final exam grade Dutch (value added)	-0.08	0.19	-0.31	0.14
Final exam grade English (value added)	0.05	0.20	-0.27	0.28
Final exam grade Math (value added)	-0.30	0.38	-0.73	0.13

Note: Statistics are based on averages at the school×year level for the application cohorts 2015-2020 ($N = 196$). For standardized test scores, the year 2020 is omitted because the test was not taken due to COVID ($N = 161$). For all statistics relating to the final exam we use the cohorts up to and including 2018 because for the cohorts 2019 and 2020 we do not have the exam scores yet ($N = 125$).

from primary school, and home address. The home addresses and the locations of schools are used to calculate home-school distances. The register also includes information on the number of available places per track in each school in each year. Using these data, we compute for each student the propensities of being assigned to the first-ranked school, the second-ranked school, the third-ranked school, and so on.

Register data

Using a personal identifier, we are able to link 99% of the students in the match data to the register data of Statistics Netherlands. The register data from Statistics Netherlands have annual information about students' position (school, track, grade) in the educational system on October 1st of each year, which is typically four to six weeks after the start of the school year. We use this to construct an indicator for enrollment in the first-ranked school, as well as variables indicating academic performance: being in the expected grade and track five years after the lottery, choosing the science or health fields, graduation from the university track on time, grade point average on central exams, and being enrolled in university. The register data also include information on two commonly used non-academic outcomes: being suspected of criminal offenses and teenage motherhood. Criminal offenses include violent crime, property crime, vandalism, drugs, and the category "other". Suspicion of criminal offenses is measured for the period between a student starting secondary school and 2024. While the register data also have information on teenage motherhood, we cannot report results in this study. The reason is that the number of cases is below the minimum number of ten observations required to adhere to privacy regulations of

Statistics Netherlands.

The data from Statistics Netherlands contain information about students' social background. We use parents' country of origin to construct an indicator for students with a Dutch (non-migrant) background, and we define low-income students as those from families with household income below the national median in the year prior to the secondary-school match. Additionally, we compute for each student how many of the other first-year students in each secondary school come from the same primary school, as well as the average score on the nationwide test in primary school of the other first-year students in their track in each secondary school. Furthermore, the register data provide detailed information about the teachers employed in each school, including their teaching experience, experience at the school, educational level, sex, age, and migration background. The level of a teacher is rated on a scale from A to E, with A for primary school teachers and E typically reserved for school management.[11] Teachers' salaries are tied to these levels, which we have translated into a scale from 1 to 5.

The survey

In 2019, the secondary schools in Amsterdam granted us permission to survey their students and merge the survey data to the data from the school match and from Statistics Netherlands. To merge the datasets, we asked students for their sex, postal code and their date of birth. The purpose of the survey was to inquire whether not being assigned to the first-ranked school has detrimental effects on a range of outcomes.

Out of the 64 secondary schools in Amsterdam, we selected 45 to be included in the survey. We excluded schools that rejected none or only a few students and also enrolled none or only a few students who lost the admission lottery elsewhere. Rather than sending students a link to an online version of the survey, we conducted in-person survey sessions in each class of the selected schools. We contacted the schools beforehand to schedule visits and coordinated with them to determine the times at which classes could participate. Additionally, we asked the schools to inform parents about the survey and provide them with the legally-required option to deny permission for the use of their children's data. Ethical approval for the study was granted by the legal department of the municipality of Amsterdam, and 77 parents exercised the opt-out option.

We collected data in 29 of the 45 selected schools before March 2020. Due to the closure of secondary schools in Amsterdam because of the Covid-19 pandemic, the survey administration was paused. After schools reopened in September 2020, we resumed data collection and managed to administer the survey in six more schools, bringing the total number of visited schools to 35. The coverage of visited schools was higher among those offering the university track. Of the 31 schools that offer the university track and were selected for the survey, 26 were visited. Since some students who started in the university track later switched to other tracks, we ensured that data

[11] Source: https://www.poraad.nl/arbeidszaken-bedrijfsvoering/lerarenfunctie-wat-is-het-grootste-verschil-tussen-een-leraar-lb-lc-en

were also collected from students in these other tracks. Below, we discuss the representativeness of the survey respondents.

The aim of the survey was to collect information about outcomes that students and parents consider important and that are not included in administrative data. The questions included in the survey were discussed with and approved by representatives of the boards of the secondary schools. The survey design was guided by the requirement that it should not take students more than 20 minutes to complete. To ensure the clarity and relevance of the questions, we piloted the survey in two schools that were not selected for a visit. Feedback from these pilot sessions was used to fine-tune several questions. Students were informed that the survey was not anonymous but that their responses would be treated confidentially. We explicitly explained that their date of birth and postal code were necessary to merge the survey data with the data from the secondary-school match and Statistics Netherlands.

The survey contains 18 questions. A translation of the survey from Dutch is included in Appendix A. The first five questions ask identifying information: sex, date of birth, postal code (or street-name), school, class and ability track. We use the answers to these questions to merge the survey data to the data from the match, and subsequently to the data from Statistics Netherlands. Twelve percent of the surveys do not have (complete) information about the (six digit) postal code or date of birth. Using an iterative procedure we could merge 12,878 of the 14,768 surveys (87%) that were filled out.

The remaining survey questions addressed various aspects of students' experiences and outcomes. Based on the responses, we constructed a set of outcome variables to summarize key aspects of the students' answers.

- Hours homework per week: This variable is based on the response to question 6 in the survey;
- Help with homework: This variable is an unweighted average of the responses to the six items in question 7, which run from 1 to 5. The items refer to help from teachers, the school, an external company, parents, and others;
- Attitudes towards school: This variable is an unweighted average of the responses to the six statements in question 10, which run from 1 to 5. This includes statements like "I find it important to get good grades", "I enjoy going to school" and "Education is important for a good life later on" (cf. Seker, 2011);
- Parental awareness: This variable is based on the response to question 9 which asks how well informed parents are about the student's school experience on a scale from 1 to 10;
- Behavior inside school: This variable is an unweighted average of the responses to the three items in question 15, which run from 1 to 5. The items refer to the frequencies of skipping class, coming late for class, and expulsion;

- Behavior outside school: This variable is an unweighted average of the responses to the four items in question 17, which run from 1 to 5. The items refer to the frequencies of consumption of alcohol, cigarettes and drugs, and having been in contact with the police;

- School satisfaction: This variable is an unweighted average of the responses to the six items in question 13, which run from 1 to 10. The items refer to satisfaction with their life in general, their school, their class, their mentor, the quality of the lessons, and extracurricular activities;

- Political civic engagement: Following Henderson et al. (2012) we make a distinction between political and social civic engagement. Political civic engagement is measured as the unweighted average of the responses the second and fifth statements in question 12, which run from 1 to 5. These statements refer to the importance of making an effort to improve the world and to students striking for climate awareness (we collected data in the period that students worldwide were following the example of Greta Thunberg).

- Social civic engagement: This variable is the unweighted average of the other three statements in question 12. These statements refer to listening to others even if opinions differ, redistribution, and interaction with people from other cultures or religions.

- Personality traits: This variable is an unweighted average of the responses to the eight statements in question 18, which run from 1 to 5. The statements refer to self-esteem, perseverance, optimism, risk tolerance, self-confidence, competitiveness, procrastination, and performance under time pressure (cf. Buser et al., 2026; Dohmen et al., 2011; Rosenberg, 1965);

- Number of friends, share of friends from the same school, and share of friends with a non-western name: In question 16 we ask respondents to list the first names of up to six friends and indicate whether these are enrolled in the same school. We summarize the responses in three variables.

When relevant, scales are reversed such that higher values represent better outcomes. Next to unweighted averages of the items and statements, we have also constructed outcome variables following the procedure proposed by Anderson (2008). This procedure weights the normalized variables underlying each index by the inverse of the covariance matrix of these variables. This method assigns lower weights to outcomes that are highly correlated and higher weights to those providing more independent information. The results of the analysis using Anderson's method are reported in the robustness section. Table C2 in the appendix reports measures of the variation in school-level mean values of the variables based on the survey. These mean values show considerable variation across schools. For example, the difference in mean school satisfaction between the first

Table 3. Number of students in university track, by year, lottery risk and survey response

Sample:	Students	Students with lottery risk	Potential surveys	Merged surveys
Year:	(1)	(2)	(3)	(4)
2015	2,026	1,620	1,337	963
2016	1,968	1,554	1,336	1,072
2017	2,117	1,746	1,490	1,220
2018	2,019	1,618	1,434	1,276
2019	2,095	1,747	1,519	1,273
2020	2,005	1,672		
Total	10,225	8,285	7,116	5,804

Note: The first column reports the number of students in the university track participating in the Amsterdam secondary-school match by year. The second column reports the number of students from column (1) whose probability to be placed in their first-ranked school is strictly between zero and one. The third column reports how many of the students in column (2) are in a school that was visited for the survey and whose first-ranked school was visited. The fourth column reports how many of the students in column (3) responded to the survey and could be merged to the register data. Total refers to the totals for 2015 to 2019, it does not include 2020, which is in light-gray.

and ninth deciles equals close to two points on a scale from 1 to 10, and the mean number of friends at the first decile is four while it is six at the ninth decile.

3.2 Descriptive statistics

Table 3 reports the total number of students in the university track by lottery year and subsequently the number of students with lottery risk, the number of students with lottery risk enrolled in a school that we visited and whose first-ranked school we visited (that is the potential number of surveys) and the number of merged surveys. Each year, around 2,000 students in the university track participate in the Amsterdam secondary-school match. The total number of participants for the five cohorts that are covered by the survey (2015-2019) equals 10,225. Over 80% of these students are at risk of not being assigned to their first-ranked school (column (2)). Of the 8,285 at-risk students, 7,116 are enrolled in a school that we visited to collect survey data, and 5,804 of them filled out a survey that we were able to merge to the register data from the school match. The rate of valid responses therefore equals 0.71 for at-risk students and 0.82 for at-risk students in visited schools. The table also includes data in light-gray for the cohort participating in the 2020 match. While this cohort is included in analyses that are based on register data, it is excluded from analyses that rely on survey data.

The top panel of Table 4 reports descriptive statistics of characteristics of students in the university track. These statistics are reported separately for (1) all students, (2) all at-risk students, (3) at-risk students enrolled in schools we visited and whose first-ranked school we also visited, and (4) the subset of students from this group for whom survey data were successfully merged with register data. While the first two columns include students from the 2020 cohort, the latter

two exclude them due to the unavailability of survey data for that year. The average age of students at the time of application is just under 12 years. Gender representation is balanced, with 50% of students registered as female. Approximately 60% of the students are of Dutch descent. University-track students come on average from relatively affluent families, with fewer than 30% belonging to households with incomes below the national median. These students also perform well academically, scoring on average more than one standard deviation above the mean on the nationwide primary school exit test.

The next panel shows that in the full sample, around 76% of students are assigned to their first-ranked school. This percentage is 71% for at-risk students. It remains almost the same when we restrict the sample to at-risk students in visited schools, and to at-risk students in visited schools with a merged survey. This indicates that survey response rates are very similar for lottery winners and losers. Panel C shows that only a minority of the students in the university track is assigned to a school that also offers lower tracks. For the full sample this share is 26% and this drops to 18% and 14% in the samples of at-risk students and students in the survey sample. The average size of the assigned school is around 950 and students live around 4 kilometers away from the school to which they are assigned. Panel D shows that students are assigned to schools where the average age of teachers is close to 50 years, teachers have (since 2006) on average 8.3 years experience as a teacher and almost seven years as teacher in the school. Slightly more than half of the teachers are female and around 70% are of Dutch descent. The teachers are on average at level of pay scale 3. Finally, panel E shows that students are assigned to schools where on average close to three of their former classmates from primary school with the same track advice are also assigned to. The share of low-income peers in the school is on average around 30%, close to 60% of the peers in the school are of Dutch descent, and the mean of the primary school test score is on average more than 0.7 standard deviation above the mean. When restricted to peers in the university track, the share of low-income peers is slightly lower, the share of peers from Dutch descent is slightly higher and the average of the mean test score is higher. A common feature in all five panels is that the differences between samples (columns) are quite small indicating that the samples of at-risk students, at-risk students in visited schools and at-risk students responding to the survey are similar to the full sample.

4 Empirical approach

Our main specification is a model that contrasts not being assigned to the first-ranked school with being assigned to the first-ranked school. We estimate the following regression model for the outcome Y of student i for whom school s was the first-ranked school:

$$Y_{is} = \delta D_i + \alpha_s + U_{is} \tag{1}$$

Table 4. Descriptive statistics

	All	At-risk	At risk + visited	At risk + survey
	(1)	(2)	(3)	(4)
A: Demographics				
Age in year of application (in years)	11.79	11.78	11.78	11.78
Female (0/1)	0.50	0.49	0.49	0.49
Dutch (0/1)	0.59	0.61	0.62	0.62
Single parent household (0/1)	0.20	0.20	0.19	0.19
Income below 50th percentile	0.29	0.26	0.25	0.25
Standardized test score	1.01	1.03	1.04	1.05
Test score missing[a]	0.18	0.18	0.02	0.02
B: Treatment				
Assigned to 1st-ranked school	0.76	0.71	0.72	0.73
Adm. prob. to 1st-rank school	0.76	0.71	0.69	0.69
C: Characteristics assigned school				
Lower track available	0.26	0.18	0.16	0.14
School: total nr students	960	932	912	905
Home-school distance	4.20	4.21	4.17	4.17
D: Teacher characteristics				
Total experience since 2006	8.27	8.37	8.23	8.30
Experience at school since 2006	6.92	6.97	6.88	6.93
Year of birth	1972.4	1972.3	1971.8	1971.9
Share female	0.53	0.53	0.53	0.53
Share Dutch	0.69	0.70	0.70	0.71
Level (scale 1-5, 5 highest)	3.11	3.15	3.18	3.19
E: Peers at assigned school				
No of former classmates (same track)	3.04	2.99	3.04	3.06
Low-income	0.32	0.29	0.28	0.27
Dutch	0.56	0.59	0.59	0.60
Test score	0.72	0.81	0.90	0.91
Same track: Low-income	0.29	0.27	0.26	0.26
Same track: Dutch	0.59	0.61	0.61	0.61
Same track: Test score	0.98	0.99	1.03	1.03
N	12,230	9,957	7,116	5,804

Note: Admission probabilities are simulated propensity scores (see Section 4). The variables that are student and school specific reflect the characteristics of the assigned school and are based on characteristics of students in grade 1 in the year that the student applies. For 2020 the primary school is missing, so the information about peers is based on cohorts 2015-2019. Columns (1) and (2) include the year 2020, while columns (3) and (4) exclude the year 2020.

[a] In 2020 no test score was administered because of the Covid-19 pandemic, explaining the larger shares of students with missing test scores in columns (1) and (2) compared to columns (3) and (4).

where α_s are fixed effects for combinations of first-ranked schools, priority status and year of application, D_i equals one if student i was not assigned to their first-ranked school (i.e. lost the lottery) and zero otherwise, and U_{is} is the error term. Due to the randomness of the lottery draws, which we will support below, the conditional mean independence assumption $E(U_{is}|D_i, \alpha_s) = E(U_{is}|\alpha_s)$ is satisfied. We restrict the analyses to at-risk students. This excludes students whose first-ranked school does not reject any student from the students' priority group, and students whose first-ranked school is not assigned to any student in their priority group (which is very rare).

In a subsequent analysis, we split "not being assigned to the first-ranked school" into being assigned to the second-ranked school, being assigned to the third-ranked school and being assigned to a school outside the top-3. To compare equals to equals, we condition on priority status and preferences that determine the probability to be assigned to schools at these different ranks. Because there are over 25,000 possibilities to choose a top-3 from 31 schools, conditioning on fixed effects for these permutations is unpractical. Instead we condition on fixed effects for first-ranked schools and on the probabilities to be assigned to the second and third-ranked schools. Following Abdulkadiroğlu et al. (2017), we compute these probabilities (propensity scores) by running the DA mechanism for 1,000 different lottery draws per year and taking the average second-ranked and third-ranked assignment rates over these draws. These propensity scores condense the information from the ROLs. In accordance with the actual mechanisms pertaining in these years, the propensity scores for 2015 are based on DA with multiple tie breaking and in 2016 to 2020 on DA with single tie breaking. The regression model is now:

$$Y_{is} = \beta_2 R_i^2 + \beta_3 R_i^3 + \beta_{>3} R_i^{>3} + f(p_i^2, p_i^3) + \alpha_s + U_{is} \tag{2}$$

where R_i^k equals 1 if student i was assigned to their k-th ranked school and zero otherwise, and p_i^k is the propensity score to be assigned to the k-th ranked school.[12] β_k is the causal effect of being assigned to the k-th ranked school instead of the first-ranked school on outcome Y.

As an alternative for equation (1) we will in a robustness check report results where we replace fixed effects α_s by 50 dummies for all two-percentiles (1-2, 3-4, 5-6, ..., 99-100) of the propensity score to be assigned to the first-ranked school. In the main specifications we do not cluster standard errors, but in Subsection 6.5 we discuss results based on clustering at the level of the assigned school. That subsection also discusses results from specifications where we apply inverse probability weighting.

Table 5 reports balancing results. The left-hand panel shows the means of characteristics of students in the at-risk sample and of their first-ranked school, separately for students assigned to their first-ranked school and for students not assigned to their first-ranked school. Column

[12] In our analyses we specify $f(p_i^2, p_i^3)$ as 20 dummies for the ventiles of p_i^2 interacted with 20 dummies for the ventiles of p_i^3.

(3) reports the differences without correcting for risk category fixed effects (α_s), and column (4) reports these differences taking account of the risk category fixed effects. While some of the differences in the third column are sizable and significantly different from zero, this is not the case in column (4). This supports our identifying assumption that conditional on risk category fixed effects, assignment to a first-ranked school is random. The right-hand panel repeats the same comparison for the sample of survey respondents. This shows that also the lottery winners and losers (and their schools) in this sample are balanced once we condition on risk category fixed effects. Comparing columns (1) and (5) shows that the characteristics of lottery losers are very similar in the full sample and in the survey sample. The same holds for the characteristics of lottery winners in columns (2) and (6).[13]

5 Treatment characteristics

Table 6 shows that losing the admission lottery implies a substantial change in school characteristics, lower school value added, lower-paid teachers, and lower performing peers from more disadvantaged backgrounds. Column (1) presents results based on equation (1), the next three columns present results based on equation (2), and the final column reports means for lottery winners.

While only 12% of the lottery winners are assigned to a school that offers other (lower) tracks (column 5), this share is 26 percentage points higher for lottery losers. Lottery losers are assigned to a school that is on average 210 meters farther from their home address and that has on average almost 41 students more than the schools to which lottery winners are assigned. Panel B shows that lottery losers are assigned to schools that score lower on the value added measure for the final exam GPA as well as on the separate measures for the exam grades for Dutch language and mathematics but higher for English language. Especially the difference for mathematics is substantial. The magnitude of 0.1 standard deviation is comparable to the differences reported in for instance Pop-Eleches and Urquiola (2013) and Deming (2011).

There are also differences in the characteristics of teachers in the schools to which lottery winners and losers are assigned (panel C). Compared to lottery winners, lottery losers are assigned to schools where teachers have on average less experience as a teacher (since 2006) but longer tenure in the assigned school. The teachers of the schools to which lottery losers are assigned are older, more often female and less often from Dutch descent than the teachers of the schools to which lottery winners are assigned. Also the pay scale of these teachers, presumably reflecting their quality, is significantly lower. Because the data do not indicate in which track(s) teachers

[13]Table C4 in the appendix shows balance based on equation (2). The final three columns report differences relative to students assigned to their first-ranked school conditional on fixed effects for the first-ranked school, together with an indication of their p-value. A few differences are statistically significant, but these differences are very small in magnitude. Subsection 6.5 discusses further robustness tests of the balancing results.

Table 5. Balance

	Admin sample				Survey sample			
	Not top-1	Top-1	Difference		Not top-1	Top-1	Difference	
	mean (SD)	mean (SD)	without α_s	with α_s	mean (SD)	mean (SD)	without α_s	with α_s
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Student characteristics								
Age (in years)	11.79 (0.39)	11.78 (0.40)	0.014	0.009	11.79 (0.40)	11.78 (0.40)	0.016	0.008
Female (0/1)	0.49 (0.50)	0.49 (0.50)	-0.006	-0.001	0.48 (0.50)	0.50 (0.50)	-0.022	-0.013
Dutch (0/1)	0.63 (0.48)	0.60 (0.49)	0.025**	0.003	0.62 (0.49)	0.62 (0.49)	-0.000	-0.017
Single parent household (0/1)	0.20 (0.40)	0.20 (0.40)	-0.005	-0.010	0.18 (0.39)	0.19 (0.39)	-0.002	-0.009
Income below 50th percentile	0.26 (0.44)	0.26 (0.44)	0.002	0.005	0.25 (0.43)	0.24 (0.43)	0.007	0.008
Standardized test score	0.87 (0.52)	0.83 (0.56)	0.039***	-0.010	1.02 (0.42)	1.04 (0.44)	-0.019	-0.009
Test score missing	0.15 (0.35)	0.20 (0.40)	-0.050***	-0.001	0.02 (0.13)	0.01 (0.12)	0.003	-0.001
Characteristics of first-ranked school								
Assigned to 1st-rank school	0.00	1.00	X	X	0.00	1.00	X	X
Probability assigned to 1st-rank school	0.62 (0.14)	0.75 (0.15)	-0.123***	0.000	0.61 (0.13)	0.73 (0.15)	-0.115***	0.000
Nr students same 1st school/prim. school	5.39 (4.23)	4.95 (4.22)	0.443***	0.101	5.54 (4.30)	4.82 (3.96)	0.725***	0.166
Nr students same track/1st school/prim. school	4.23 (3.48)	3.58 (3.14)	0.651***	0.033	4.50 (3.58)	3.76 (3.24)	0.736***	0.106
Home-school distance 1st-rank school (in km)	4.25 (3.27)	4.15 (3.21)	0.100	0.058	4.15 (3.12)	4.10 (3.21)	0.059	0.030
N	2,872	7,085			1,558	4,246		

Note: Columns (1) and (2) present means and standard deviations. Results are based on the at-risk sample. Column (3) reports the difference between the means of columns (1) and (2). Column (4) reports the coefficients from regressions of each characteristic on an indicator for not being assigned to the first-ranked school and fixed effects for the first-ranked school. Columns (5) - (8) follow columns (1) - (4) but using only the survey sample. Stars indicate whether the (conditional) differences in column (3),(4), (7) and (8) are significantly different from zero. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

teach, we cannot estimate these differences at the school×track level. The differences in teacher characteristics can therefore be (in part) due to the fact that lottery losers are more often assigned to schools that offer other tracks next to the university track.

Panel D shows that there are significant differences in the peer characteristics between the schools to which lottery winners and losers are assigned. Losing the lottery implies being assigned to a school with fewer students who come from the same primary school, with more peers from low-income families, with fewer peers from Dutch descent, and with peers who score on average lower on the exit test from primary school. These patterns hold at the school level as well as at the school×track level. The sizes of the differences in peer characteristics are comparable to the differences reported in other studies. For example, Cullen et al. (2006) report a difference in the fraction of Black students of 0.037 and in the share of student on free lunch of 0.021. Deming (2011) reports a difference in the share of Black students of 0.054. The difference in the mean test score of peers in the school is comparable to the one fifth of a standard deviation reported in Jackson (2010).

Most effects on characteristics of school, school value added, teachers and peers increase monotonically in size with the rank of the assigned school. That is: absolute effect sizes are in most cases larger for students assigned to a school outside their top-3 than for students assigned to their third-ranked school, which in turn are larger than for students assigned to their second-ranked school.[14]

6 Results

This section presents estimates of the effects of not being assigned to the first-ranked school on enrollment (Subsection 6.1), on academic and other outcomes measured in the register data (Subsection 6.2) and on the outcomes measured in the survey (Subsection 6.3). Next it discusses results from heterogeneity analyses inquiring whether specific groups of students are harmed by not being assigned to their first-ranked school (Subsection 6.4) and from robustness analyses (Subsection 6.5).

6.1 Enrollment

The first row of Table 7 shows that not being assigned to the first-ranked school has a large effect on the probability to be enrolled in the first-ranked school in the first year after the lottery. Column (1) is based on equation (1) and columns (2) to (4) on equation (2). The control mean tells that 98% of the lottery winners are in the first year enrolled in the school they ranked first. The effect estimate of -0.905 means that 7.5% ($= (0.98 - 0.905) \times 100\%$) of the lottery losers are in the first

[14]Subsection 6.5 discusses that effects on treatment characteristics are very similar for the survey sample. See also Table C10 in the appendix.

Table 6. Effects of not being assigned to first-ranked school on characteristics of school, teachers and peers

Assignment:	outside top-1 (1)	2nd ranked (2)	3rd ranked (3)	outside top-3 (4)	Contr mean
A: School characteristics					
Lower track available (0/1)	0.258***	0.172***	0.223***	0.368***	0.12
	(0.010)	(0.013)	(0.019)	(0.016)	
Home-school distance (in km)	0.210***	0.169	0.335**	0.238**	4.15
	(0.077)	(0.106)	(0.166)	(0.112)	
School: total nr students	41.5***	26.2***	21.9*	70.6***	921.4
	(6.0)	(8.0)	(12.3)	(10.4)	
B: School value added					
Final exam GPA	-0.026***	-0.010**	0.002	-0.058***	0.00
	(0.003)	(0.005)	(0.007)	(0.006)	
Final exam grade Dutch	-0.034***	-0.033***	-0.023***	-0.038***	-0.00
	(0.004)	(0.005)	(0.007)	(0.006)	
Final exam grade English	0.023***	0.008	0.034***	0.035***	0.08
	(0.003)	(0.005)	(0.007)	(0.006)	
Final exam grade Math	-0.097***	-0.050***	-0.074***	-0.165***	-0.03
	(0.008)	(0.010)	(0.015)	(0.013)	
C: Teacher characteristics					
Total experience since 2006 (yrs)	-0.177***	-0.033	0.006	-0.447***	8.46
	(0.022)	(0.028)	(0.044)	(0.038)	
Experience at school since 2006 (yrs)	0.130***	0.156***	0.434***	-0.069	6.99
	(0.028)	(0.042)	(0.060)	(0.047)	
Year of birth	-0.437***	-0.471***	-0.827***	-0.185**	1972
	(0.045)	(0.064)	(0.095)	(0.073)	
Share female	0.016***	0.009***	0.011***	0.028***	0.53
	(0.001)	(0.002)	(0.002)	(0.002)	
Share Dutch	-0.030***	-0.019***	-0.030***	-0.042***	0.70
	(0.002)	(0.002)	(0.003)	(0.003)	
Level (pay scale 1-5, 5 best)	-0.070***	-0.013	-0.028**	-0.165***	3.17
	(0.006)	(0.008)	(0.012)	(0.010)	
D: Peers					
No of former classmates	-0.709***	-0.449***	-0.668***	-0.998***	3.14
(same track)	(0.061)	(0.088)	(0.127)	(0.084)	
Share low-income	0.068***	0.043***	0.055***	0.104***	0.27
	(0.003)	(0.003)	(0.005)	(0.004)	
Share Dutch	-0.062***	-0.049***	-0.058***	-0.079***	0.60
	(0.003)	(0.004)	(0.005)	(0.005)	
Mean test score	-0.242***	-0.146***	-0.183***	-0.385***	0.86
	(0.008)	(0.009)	(0.014)	(0.013)	
Share low-income in same track	0.037***	0.025***	0.030***	0.057***	0.26
	(0.002)	(0.003)	(0.005)	(0.004)	
Share Dutch in same track	-0.033***	-0.031***	-0.036***	-0.034***	0.61
	(0.003)	(0.004)	(0.005)	(0.006)	
Mean test score in same track	-0.026***	-0.012***	-0.017***	-0.048***	0.98
	(0.003)	(0.004)	(0.006)	(0.006)	
N	9,957	9,957			

Note: Each cell in column (1) presents the coefficient of D from a separate regression of equation (1) where the variable indicated by the row entry is the dependent variable. The cells in columns (2)-(4) in each row present the coefficients of R^2, R^3 and $R^{>3}$ from a separate regression of equation (2) where the variable indicated by the row entry is the dependent variable. The cells in the last column present the mean among the students who were assigned to the first-ranked school. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7. Effects on enrollment in first-ranked school by year since lottery

Assignment:	outside top-1	2nd ranked	3rd ranked	outside top-3	Contr mean
	(1)	(2)	(3)	(4)	
year 1	-0.905***	-0.915***	-0.926***	-0.884***	0.98
	(0.005)	(0.007)	(0.009)	(0.010)	
year 4	-0.765***	-0.791***	-0.789***	-0.726***	0.86
	(0.007)	(0.009)	(0.012)	(0.012)	
N	9,957				

Note: The cells in column (1) present the coefficient of D from a separate regression of equation (1) where the variable indicated by the row entry is the dependent variable. The cells in columns (2)-(4) in each row present the coefficients of R^2, R^3 and $R^{>3}$ from a separate regression of equation (2) where the variable indicated by the row entry is the dependent variable. The cells in the final column present the mean among the students who were assigned to the first-ranked school. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

year enrolled in the school they ranked first. Compliance with the assigned treatment is thus close to perfect. Two percent of the winners did not enroll in the school they ranked first. More than half of these never-takers moved out of Amsterdam, making moving a likely explanation for this form of non-compliance.[15]

The outcome of the lottery also has a large effect on the probability to be enrolled in the first-ranked school four years after the lottery. Eighty-six percent of the lottery winners are still enrolled in their first-ranked school. The effect estimate of -0.765 means that 9.5% ($= (0.86 - 0.765) \times 100\%$) of the lottery losers are in the fourth year enrolled in their first-ranked school. Twelve percent of the lottery winners are thus changing schools between the first and fourth year. In that period, only two additional percent of the lottery losers manage to obtain a place in their first-ranked school. The results in columns (2) to (4) indicate that compliance with the treatment is somewhat smaller among students assigned to a school outside their top-3 compared to students assigned to their second- or third-ranked schools. All in all, compliance with the assignment to the first-ranked school is high.

6.2 Academic outcomes

Table 8 presents results for the academic outcomes and for the crime outcome measured in the register data. Because not all students in our sample have yet completed their (secondary) school career, numbers of observations differ between outcomes. The results in column (1) show that five years after starting secondary school, 60% of lottery winners are enrolled in the fifth year of the university track. This share is not significantly different for losers of the admission lottery. Also the share that passed the exam of the university track on time is not affected by losing the lottery. Nor are there effects on final exam GPA, the separate grades for Dutch and mathematics or on enrollment in university. In all cases the estimated effects are close to zero and the standard

[15]The non-compliance by some of the lottery winners opens up 142 ($= 0.02 \times 7085$) places at oversubscribed schools. With some rippling down, this is probably sufficient to place 215 ($= 0.075 \times 2872$) lottery losers from the waiting list in their first-ranked schools.

errors are small enough to exclude modestly sized negative effects with 95% probability. The only academic outcomes for which we find statistically significant effects are that losing the lottery increases the probability to choose the science or health track, and the final exam grade for English. The science and health tracks are in Dutch education generally seen as more challenging (e.g. Buser et al., 2014). A possible mechanism for the effect on the choice for a more challenging field is that lottery losers are more likely to be among the best students in their class (cf. Panel D in Table 6). The positive effect of losing the lottery on the final exam grade for English language concurs with the higher value added that the schools that lottery losers attend, have for that subject. Columns (2) to (4) show that effect estimates are very similar for students being assigned to the school they ranked second, third or lower on their ROL. In conclusion, being assigned to a less preferred school has no negative impact on any of the academic outcomes, and for some even a positive impact.[16,17]

6.3 Survey outcomes

We now turn to the effects on outcomes that we constructed on the basis of the survey responses. The first column of Table 9 presents results based on equation (1), columns (2) to (4) are based on equation (2). Most of the estimates in the first are close to zero and not significantly different from it. Not being assigned to the first-ranked school has no negative (or positive) effects on: help with homework, attitudes towards school, parental awareness, behavior inside school, behavior outside school, school satisfaction, personality traits, number of friends, share of friends from school, and share of friends with a non-western name.

There are three exceptions. First, lottery losers spend per week about half an hour more on homework than lottery winners. Further analysis reveals that this effect is concentrated in the upper grades (years 4 and 5). The effect can therefore be attributed to lottery losers choosing more often for the more demanding science and health fields. Second, lottery losers score significantly lower on political civic engagement than winners. This captures agreement with statements about striking for the climate and commitment to a better world. Third, lottery losers score at the same time significantly higher than winners on social civic engagement. This captures agreement with statements about respecting others' opinions, redistribution, and diversity. We consider the exposure to a more diverse peer group a likely mechanism behind these differential effects on the two dimensions of civic engagement. Lottery winners attend schools with on average fewer

[16]The final row of Table 8 shows results for being suspected of any crime. The control means indicate that the incidence of suspicion of crime is rather low. The effect estimates show that not assigning students to their first-ranked school does not make it more likely that they will be suspected of crime.

[17]Table C3 reports results from regressions that include fixed effects for assigned school instead of fixed effects for first-ranked school. Because these results should not be interpreted causally, we label this the naive approach. The results show that lottery losers are almost 4 percentage points more likely to pass the final exam of the university track on time. They are also more likely to choose the science or health tracks and to enroll in university. These differences indicate that lottery losers are assigned to schools where they do better than their classmates who are on average from less affluent families and who did on average worse on the exit test from primary school (cf. Table 6).

Table 8. Academic and other admin outcomes

	outside top-1 (1)	2nd ranked (2)	3rd ranked (3)	outside top-3 (4)	Contr mean	N
In expected grade/track year 5	-0.011 (0.010)	-0.001 (0.014)	-0.038 (0.020)*	-0.005 (0.014)	0.60	9,957
Science or health track	0.030 (0.012)**	0.034 (0.017)**	0.026 (0.023)	0.026 (0.017)	0.46	9,957
Exam passed on time/track	-0.002 (0.014)	0.014 (0.019)	-0.024 (0.027)	-0.008 (0.020)	0.61	6,554
Final exam GPA (1-10)	0.010 (0.026)	0.041 (0.036)	-0.032 (0.051)	-0.004 (0.038)	6.70	5,710
Final exam grade Dutch	-0.024 (0.026)	-0.016 (0.037)	-0.040 (0.052)	-0.024 (0.040)	6.48	5,707
Final exam grade English	0.070 (0.032)**	0.054 (0.044)	0.087 (0.060)	0.063 (0.048)	7.34	5,690
Final exam grade Math	0.004 (0.043)	0.061 (0.060)	0.017 (0.083)	-0.052 (0.065)	6.88	5,617
Enrolled in university	0.016 (0.015)	0.058 (0.021)***	-0.001 (0.028)	-0.014 (0.022)	0.52	4,920
Crime	0.004 (0.007)	0.007 (0.010)	-0.010 (0.013)	0.006 (0.009)	0.04	9,957

Note: Each cell in column (1) presents the coefficient of D from a separate regression of equation (1) where the variable indicated by the row entry is the dependent variable. The cells in columns (2)-(4) in each row present the coefficients of R^2, R^3 and $R^{>3}$ from a separate regression of equation (2) where the variable indicated by the row entry is the dependent variable. Final exam GPA and exam grades for the specific subjects are conditional on taking the exam, irrespective of the year and the track thereof. The control mean refers to the mean among the students who were assigned to their first-ranked school. There are insufficient cases of teenage motherhood to be allowed to report the results. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

students that differ from them in terms of ability track, ethnicity, family income, test score from primary school, and the primary school they attended, than lottery losers. Their civic engagement therefore develops in a rather homogeneous social group and may thus be directed to global factors including the climate and a better world. The civic engagement of lottery losers develops in a more heterogeneous social group and may therefore be directed to more local factors including the opinions, culture and income position of their peers.

The results in columns (2) to (4), which are based on equation (2), reveal no systematic pattern with regard to the exact rank of the school to which lottery losers are assigned. In particular, there is no indication that lottery losers are worse off outside their top-3 than in their third or second ranked schools.

Table C5 in the appendix shows estimates of the effects on the variables underlying each of the index outcomes. This shows that for most indices also none of the underlying variables is significantly different from zero. This includes help with homework by parents or an external organization, suggesting the absence of a parental response to compensate for assignment to a lower-ranked school (e.g. Pop-Eleches and Urquiola, 2013). The results reveal that the negative effect for political civic engagement is driven by the 'striking for the climate' statement, while the positive effect for social civic engagement is very similar for the three statements included on this index.

6.4 Heterogeneous effects

The results presented so far show that lottery losers are on average not harmed by not being assigned to their first-ranked school. This does, however, not exclude the possibility that specific groups of students are harmed. To investigate this, we consider separate effects for boys and girls, for students from low and high SES families, for students from Dutch and non-Dutch descent, and for students with below and above median scores on the exit test from primary school. Results are in Table C6 in the appendix. The table presents estimates for compliance (after four years), administrative outcomes and survey outcomes. There are only a few instances where effects for one of the groups give a different picture than that for the full sample. Male lottery losers are after five years somewhat less likely to be on track than male lottery winners. There is no such an effect of losing the lottery for female students. The effect of losing the lottery on homework hours turns out to be entirely due to female lottery losers and lottery losers who scored below the median on the exit test from primary school. This is consistent with these two groups also being more likely to opt for the science and health tracks. Interestingly, the positive effect of losing the lottery on social civic engagement appears to be concentrated among certain groups. Especially boys and students from Dutch descent score higher on social civic engagement when assigned to a lower ranked and therefore often more diverse school.

All in all, we conclude that there is no evidence that specific groups of students are harmed by

Table 9. Survey outcomes

	outside top-1 (1)	2nd ranked (2)	3rd ranked (3)	outside top-3 (4)	Contr mean
Hours homework per week	0.506 (0.183)***	0.626 (0.254)**	0.154 (0.339)	0.597 (0.301)**	7.44
Help with homework	-0.022 (0.019)	-0.026 (0.025)	-0.002 (0.036)	-0.023 (0.030)	2.01
Attitudes towards school	0.011 (0.016)	0.056 (0.022)***	-0.032 (0.030)	-0.026 (0.024)	4.01
Parental awareness	-0.002 (0.052)	0.077 (0.071)	-0.066 (0.104)	-0.039 (0.082)	8.47
Behavior inside school	-0.012 (0.019)	-0.002 (0.027)	-0.054 (0.040)	0.003 (0.031)	4.41
Behavior outside school	-0.011 (0.016)	0.021 (0.022)	-0.011 (0.029)	-0.046 (0.026)*	3.70
School satisfaction	-0.008 (0.037)	0.066 (0.052)	-0.065 (0.074)	-0.070 (0.058)	7.46
Political civic engagement	-0.042 (0.024)*	-0.033 (0.034)	-0.049 (0.047)	-0.044 (0.037)	4.00
Social civic engagement	0.051 (0.019)***	0.075 (0.027)***	-0.003 (0.036)	0.039 (0.029)	3.90
Personality traits	0.017 (0.018)	0.039 (0.024)	-0.026 (0.034)	0.013 (0.028)	3.45
Number of friends (max 6)	0.008 (0.045)	-0.001 (0.065)	0.039 (0.085)	0.013 (0.071)	5.38
Share friends from school	-0.012 (0.008)	0.006 (0.012)	-0.030 (0.016)*	-0.028 (0.013)**	0.68
Share friends non-western name	-0.003 (0.012)	0.006 (0.017)	-0.025 (0.022)	0.005 (0.018)	0.24
N	5,804				

Note: Each cell in column (1) presents the coefficient of D from a separate regression of equation (1) where the variable indicated by the row entry is the dependent variable. The cells in columns (2)-(4) in each row present the coefficients of R^2, R^3 and $R^{>3}$ from a separate regression of equation (2) where the variable indicated by the row entry is the dependent variable. There is some item non-response, with the lowest number of observations for the share friends with a non-western name (5,556 observations). For most indices the number of missing observations is less than 50. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

not being assigned to their first-ranked school.

6.5 Robustness

Appendix C includes tables that show that the results we have presented so far are robust across a variety of different sample selections and specification choices. Specifically:

- To check the sensitivity of using fixed effects for first-ranked school × year × priority groups, column (4) of Table C7 reports differences that are based on regressions that include 50 bins for the propensity score to be assigned to the first-ranked school. The differences between these results and those in Table 5 in the main text are minimal.

- To check the sensitivity of using weighing observations equally, Tables C8 and C9 weigh observations with the inverse of the propensity score to not be assigned to the first-ranked school (cf. Li et al., 2018; Goldsmith-Pinkham et al., 2024). Differences between results in these tables and those in Tables 5 and 8 in the main text are minimal.

- As an additional assessment of differences between the survey sample and the register sample, Tables C10 and C11 repeat the analyses of Tables 6 and 8 (treatment and academic outcomes) in the main text but are based on the survey sample instead of the full sample from the register. Most of the treatment differences and effects on administrative outcomes in the full sample are very similar in the survey sample.

- As another assessment of the accuracy of the survey sample, the results in Table C12 weighs observations with the inverse of the propensity score of having responded to the survey. This propensity score is based on a logit regression of an indicator of response on observable characteristics. The results in this table are very similar to those in Table 9 in the main text.

- In the main analyses we have used outcomes that are constructed as unweighed averages of the responses to several survey questions. To assess the sensitivity to using equal weights, we have also constructed indices of the outcomes using the procedure described in Anderson (2008). The results in Table C13 are similar to those in Table 9 in the main text.

- To assess sensitivity to clustering of standard errors, Table C14 reports standard errors that are clustered at the level of the assigned school. This leaves standard errors unchanged or reduces them slightly compared to Table 8 in the main text. The significant effects for the science and health track and for the English exam grade remain.

- Table C15 is similar to Table 8 in the main text but now we control for the simulated probability to be assigned to the first-ranked school instead of fixed effects for first-ranked school × year × priority groups. Results are almost identical.

- Table C16 is similar to Table 9 in the main text but now observations are restricted to schools that we visited before the school closure due to the Covid crisis. This has almost no impact on the effect estimates.

7 Conclusion

This paper estimates the causal effects of attending a preferred secondary school on a comprehensive set of outcomes. We exploit lottery-based assignment in Amsterdam's centralized school matching system, which generates exogenous variation in whether students are admitted to their first-ranked secondary school. Students who are not admitted to their preferred school attend schools that are more socioeconomically and ethnically diverse, and score lower on conventional value added measures. They are also located farther from students' homes and enroll fewer former primary-school classmates.

Despite these clear differences in school environment, we find no evidence that attending a preferred school improves academic outcomes. This concurs with results from previous studies (e.g. Cullen et al., 2006; Clark, 2010; Lucas and Mbiti, 2014; Abdulkadiroğlu et al., 2014; Angrist and Rokkanen, 2015; Abdulkadiroğlu et al., 2018; Barrow et al., 2020; Wu et al., 2019; Oosterbeek et al., 2023). The novel contribution of this study is the examination of a much wider range of non-academic outcomes than previous studies have considered. Across most dimensions, including school satisfaction, attitudes toward school, parental involvement, behavior, personality traits, and friendships, we find no evidence that attending a preferred school improves outcomes. The main exception concerns social civic engagement. Students who are not assigned to their preferred school exhibit greater appreciation of diversity, stronger support for redistribution, and greater respect for others' opinions. These effects are consistent with exposure to more diverse peer environments.

Our findings have important implications for school assignment in a setting with a diverse student population and free school choice without catchment areas. Prioritizing student preferences yields no benefits for academic and non-academic outcomes and contributes to segregation across schools because preferences differ systematically across socioeconomic and ethnic groups (cf. Oosterbeek et al., 2021). Assignment policies that promote more diverse schools may enhance social integration without compromising student outcomes.

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A The survey

Below is a translation from Dutch of the questions included in survey.

You receive this questionnaire because we want to know about your experiences in your school. We kindly request you to fill out the questionnaire.

Your answers will be treated with confidentiality. By filling out the questionnaire, you give permission to merge your answers to administrative information and to use the data for research purposes. Your responses to the questionnaire are personal. Therefore, do not discuss with others while responding.

1. Personal data

   (a) Sex _____

   (b) Date of birth _____

   (c) Postal code _____O don't know (go to question 4)

2. In which school are you enrolled? School: _____

3. What is the name of your class? Class: _____

4. Name of street where you live _____

5. What is your current education level? If you are in a mixed level, you can indicate multiple levels.

   - vocational basic
   - vocational cadre
   - vocational theory
   - college
   - university

6. How many hours per week do you on average spend on homework? _____ hours

7. How often do you get help with homework from:

   1 = never

   2 = almost never

   3 = every now and then

   4 = regularly

5 = often

	1	2	3	4	5
Your mentor	O	O	O	O	O
Other teachers in school	O	O	O	O	O
Homework class in school	O	O	O	O	O
Homework class outside school	O	O	O	O	O
Parents	O	O	O	O	O
Other family members/acquaintances	O	O	O	O	O

8. Is it possible to get extra guidance in school if necessary?

Completely impossible [] [] [] [] [] [] [] [] [] [] Very possible
1 2 3 4 5 6 7 8 9 10

O Don't know

9. Are your parents well informed about how you are doing in school?

Completely uninformed [] [] [] [] [] [] [] [] [] [] Very well informed
1 2 3 4 5 6 7 8 9 10

10. Do you disagree or agree with the following statements?

1 = very much disagree

2 = disagree

3 = neutral

4 = agree

5 = very much agree

	1	2	3	4	5
I find it important to get good grades in school	O	O	O	O	O
I try my best in school	O	O	O	O	O
I like going to school	O	O	O	O	O
I feel safe in school	O	O	O	O	O
I feel that I can be myself in school	O	O	O	O	O
School is important to have a good life in the future	O	O	O	O	O

11. A. What is your current average grade for:

Dutch: O not applicable

Mathematics: O not applicable

B. What is your current grade point average?

GPA: O not applicable

12. Below are some statements. We ask you to indicate whether you disagree or agree with the statements.

    1 = very much disagree

    2 = disagree

    3 = neutral

    4 = agree

    5 = very much agree

	1	2	3	4	5
People must listen carefully to each other, even if they disagree	O	O	O	O	O
I think it's important that children and young people are committed to a better world	O	O	O	O	O
People who earn enough must take care of people who are less fortunate	O	O	O	O	O
I like to hang out with people who are different from me, for example with a different religion or culture	O	O	O	O	O
I think it's good that students go on strike for the climate	O	O	O	O	O

13. On a scale from 1 to 10, how satisfied are you with:

    Your life in general?

Very dissatisfied	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	Very satisfied
	1	2	3	4	5	6	7	8	9	10	

    Your current school?

Very dissatisfied	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	Very satisfied
	1	2	3	4	5	6	7	8	9	10	

    Your current class?

Very dissatisfied	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	Very satisfied
	1	2	3	4	5	6	7	8	9	10	

    Your mentor?

Very dissatisfied	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	Very satisfied
	1	2	3	4	5	6	7	8	9	10	

    The quality of the lessons?

Very dissatisfied	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	Very satisfied
	1	2	3	4	5	6	7	8	9	10	

The extracurricular activities the school organizes?

Very dissatisfied	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	Very satisfied
	1	2	3	4	5	6	7	8	9	10	

14. Would you rather attend another school in Amsterdam?

    O yes, very much

    O yes. probably

    O rather not

    O definitely not

15. How often:

    1 = every day

    2 = one or multiple times per week

    3 = one or multiple times per month

    4 = less often

    5 = never

	1	2	3	4	5
have you skipped a class?	O	O	O	O	O
have you been too late for class?	O	O	O	O	O
have you been expelled from class?	O	O	O	O	O

16. What are the first names of the (maximum) six friends with whom you interact most often?

    1. _____ attends the same school yes/no
    2. _____ attends the same school yes/no
    3. _____ attends the same school yes/no
    4. _____ attends the same school yes/no
    5. _____ attends the same school yes/no
    6. _____ attends the same school yes/no

17. How often

    1 = never

    2 = almost never

    3 = every month

    4 = every week

    5 = I don't know

	1	2	3	4	5
do you drink alcohol?	O	O	O	O	O
do you smoke cigarettes?	O	O	O	O	O
do you use drugs?	O	O	O	O	O
have you been in contact with the police?	O	O	O	O	O

18. Below are some statements. We ask you to indicate how well each statement applies to you.

    1 = does not apply at all

    2 = does not apply

    3 = neutral

    4 = applies

    5 = applies very well

	1	2	3	4	5
I'm satisfied with myself the way I am	O	O	O	O	O
I'm a go-getter	O	O	O	O	O
I think it will go well with me in the future	O	O	O	O	O
I like taking risks	O	O	O	O	O
I have confidence in myself	O	O	O	O	O
I like competition	O	O	O	O	O
I delay annoying things	O	O	O	O	O
I perform well under time pressure	O	O	O	O	O

B Creation of value added measure

First, we collected results for the exam years 2019-2024, both overall grades and subject-specific grades for all students in the Netherlands. For each individual in this dataset, we code the results of the first central exam that they have made. For this sample of all exam-takers in the Netherlands, we link information on their test score at the final test at the end of primary school (cito or other). This requires data from 2011-2019 to also cover students who repeated a grade in secondary school. Based on this data, we define the cohort as the year of the start of secondary school and the track advice (advice_cbs).

Next, we regress the central exam grade[18] (either combined grade, Dutch, English or math) on: cohort dummies, dummies for the specific test used in the student's primary school, the standardized score on the test at the end of primary school, a dummy indicating if that score is missing, track of central exam, year of central exam and (only for Dutch/English/math) the type/level of the exam they took. Based on this regression, we generate a predicted exam score, and take the difference between the actual and predicted scores. This creates exam results that are corrected for student initial ability.

Finally, we construct a panel in which each school is linked to the students that attended that school. We then collapse this by school times year. This results in weighted averages of the corrected exam results of the students that ever attended that school and made the exam in the years 2019-2024, with weights proportional to that the number of years a student attended a school.We interpret these weighted averages as conventional value added measures of schools (cf. Angrist et al., 2017).

C Additional tables and figures

This appendix presents tables with additional information and results.

Table C1 shows per school offering the university track their capacities, numbers of applicants, numbers of assigned places, numbers of places assigned to students that ranked the school first, and numbers of students on the waiting list. Data are for 2016.

Table C4 is similar to Table 5 in the main text but compares students who were assigned to their first-ranked school (column 4) to: students who were assigned to a school outside the top-3 (column 1), students who were assigned to their number 3 (column 2) and students who were assigned to their number 2 (column 3). The final three columns reported differences relative to students assigned to their first-ranked school conditional in fixed effects for the first-ranked school, together with an indication of their p-value. A few differences are statistically significant, but these differences are small in magnitude.

[18]Students sit the central exam in May. These are standardized national exams. Depending on their specialization, students may take a different "type/level" of math, Dutch etc.

Table C3 reports results from regression of academic outcomes on a dummy for placement in first-ranked school and fixed effects for assigned school instead of fixed effects for first-ranked school as in equation (1).

Table C5 shows estimates of the effects on the variables underlying each of the index outcomes. This shows that for most indices also none of the underlying variables is significantly different from zero. The noticeable exception occurs for the variables used for the index outcome civic engagement. Students who were not assigned to their first-ranked school are more in agreement with the statements regarding "listen to others" and diversity than students who were assigned to their first-ranked school, but they are less in agreement with the statement about striking for the climate.

Table C6 presents results from specifications that allow for heterogeneity of treatment effects along different dimensions. Columns (1) and (2) consider differences by sex, columns (3) and (4) consider differences by SES, columns (5) and (6) consider differences by parental migration background and columns (7) and (8) consider differences by students' test score on the nationwide exit test from primary school. The overall picture is that very few of the estimates of differential effects are significantly different from zero. Most noticeable are the findings in the first row, which indicate that students from low-SES families, students with a non-Dutch background, and students with a standardized test score below the median who were not assigned to their first ranked school, are a bit more likely to be enrolled in that school in the fourth year than their counterparts. Furthermore, the positive effect of not being assigned to the first-ranked school on hours of homework appears to be entirely due to the response of girls.

Table C7 is similar to Table 5 in the main text but now the differences in column (4) are based on regressions that include 50 bins for the propensity score to be assigned to the first-ranked school instead of fixed effects for first-ranked school $\times$ year $\times$ priority groups. The differences between both tables are minimal.

Tables C8 and C9 are similar to Tables 5 and 8 in the main text but now observations are weighted with the inverse of the propensity score to not be assigned to the first-ranked school (cf. Li et al., 2018; Goldsmith-Pinkham et al., 2024). Differences between both tables are minimal.

Table C10 is the same as Table 6 in the main text but is based on the survey sample instead of the full sample from the register. Most of the treatment differences in the full sample are also present in the survey sample.

Columns (1) and (2) of Table C11 repeats the results from Table 8 in the main text. These results are based on the full (register) sample. The subsequent columns report estimates based on the survey sample. This shows that we find very similar results for the survey sample as for the register sample.

Table C12 is similar to Table 9 in the main text but now observations are weighted with the inverse of the propensity score of having responded to the survey. This propensity score is based on a logit regression of an indicator of response on the interacted observable characteristics female,

Dutch descent, low income, switched school by 2019 and the interaction of the first-ranked school and the placement rank (1, 2, 3, 3+). The results in the two tables are very similar.

Table C13 is similar to Table 9 in the main text but now indices of the outcomes are constructed using the procedure described in Anderson (2008). This procedure weights the normalized variables underlying each index by the inverse of the covariance matrix of these variables. The table only includes other outcomes that are constructed from multiple underlying variables. The results in the two tables are very similar.

Table C14 is similar to Table 8 in the main text but now error terms are clustered at the level of the assigned school. This leaves standard errors unchanged or reduces them slightly. The single significant effect (science and health track) remains significant.

Table C15 is similar to Table 8 in the main text but now we control for the simulated probability to be assigned to the first-ranked school instead of fixed effects for first-ranked school $\times$ year $\times$ priority groups. Results are almost identical.

Table C16 is similar to Table 9 in the main text but now observations are restricted to schools that we visited before the school closure due to the Covid crisis. This has almost no impact on the effect estimates.

Table C1. Capacities, applicants, assigned students and waiting list for schools offering the university track

School:	Capacity	Applicants	Assigned place	Assigned first ranked	On waiting list
	(1)	(2)	(3)	(4)	(5)
Barlaeus Gymnasium	145	174	145	139	131
Berlage Lyceum	84	17	30	17	0
Caland 2	150	9	10	9	0
Calandlyceum	108	67	68	67	0
Cartesius 2	56	17	24	17	0
Cartesius Lyceum	56	23	52	23	0
Comenius Lyceum	60	9	10	9	0
Cygnus Gymnasium	174	201	174	163	116
Damstede Lyceum	56	34	53	34	0
Fons Vitae Lyceum	70	26	70	25	22
Geert Groote College	42	34	42	34	1
Gerrit van der Veen College	60	28	45	28	3
Hervormd Lyceum West	92	4	5	4	0
Hervormd Lyceum Zuid	173	42	37	36	56
Het 4E Gymnasium	140	156	140	124	119
Het Amsterdams Lyceum	172	221	172	169	172
Hyperion Lyceum	145	243	139	137	185
IJburg College	15	8	8	8	0
Joodse SG Maimonides	45	5	6	5	0
Metis Montessori Lyceum	65	22	29	21	0
Montessori Lyceum Amsterdam	84	54	84	53	12
Open Schoolgemeenschap Bijlmer	144	21	24	21	0
Pieter Nieuwland College	84	70	80	66	8
Scholengemeenschap Reigersbos	50	6	7	6	0
Spinoza Lyceum	87	77	85	62	56
Spinoza20first	20	6	9	6	0
St. Ignatiusgymnasium	162	169	162	143	105
St. Nicolaaslyceum	140	140	132	104	131
Vinse School	22	3	1	1	4
Vossius Gymnasium	140	112	140	100	85

Note: The information in this table is based on data from 2016. The first column reports each school's capacity at the university track. The second column reports for each school the number of students assigned to the university track who first-ranked that school. The third column reports for each school the number of students who were assigned to that school. The fourth column reports per school the number of students who were assigned to that school and who first-ranked that school. The fifth column reports per school how many students are on the waiting list of that school, that is: were placed in a school that is lower on their ROL. For some schools, the reported numbers are summed over different programs (e.g. sports, bilingual, music, dance); this explains why Spinoza Lyceum and St. Nicolaaslyceum enroll fewer students than their (summed) capacities and still have students on their waiting lists.

Table C2. Variation in school-level mean responses on survey questions

School characteristic:	Mean	Std.dev.	1st decile	9th decile
How many hours a week do you spend with homework on average?	7.45	3.19	3.73	10.25
Help with homework	2.01	0.29	1.70	2.38
Attitudes towards school	3.98	0.29	3.71	4.30
Are your parents well aware of how you are doing at school?	8.40	0.80	7.31	9.23
Behavior inside school	4.43	0.27	4.06	4.73
Behavior outside school	3.71	0.27	3.32	4.00
School satisfaction	7.29	0.75	6.45	8.25
Political civic engagement	3.91	0.36	3.57	4.25
Social civic engagement	3.92	0.27	3.67	4.17
Personality	3.45	0.33	3.23	3.73
Total number of friends	5.14	0.90	4.03	6.00
Share friends from school	0.68	0.14	0.56	0.79
Share friends with non-western name	0.30	0.20	0.11	0.58

Note: Statistics are based on averages at the school×year level.

Table C3. Naive approach

	Naive approach	Contr mean	N
In expected grade/track year 5	0.023 (0.011)**	0.60	9,957
Science or health track	0.027 (0.013)**	0.46	9,957
Exam passed on time/track	0.038 (0.015)**	0.61	6,554
Final exam GPA (1-10)	0.006 (0.029)	6.70	5,710
Enrolled in university	0.035 (0.016)**	0.52	4,920
Crime	-0.001 (0.007)	0.04	9,957

Note: Each cell presents the coefficient of D from a separate regression of equation (1) with fixed effects for assigned school instead of first-ranked school. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Final exam GPA is conditional on taking the exam, irrespective of the year and the track thereof.

Table C4. Balance table based on equation (2)

	Out-3 mean (SD) (1)	Top-3 mean (SD) (2)	Top-2 mean (SD) (3)	Top-1 mean (SD) (4)	(1) vs (4) (5)	(2) vs (4) with α_s (6)	(3) vs (4) (7)	Joint p-value (8)
Student characteristics								
Age (in years)	11.79 (0.38)	11.80 (0.39)	11.79 (0.40)	11.78 (0.40)	0.017	0.023	-0.000	0.484
Female (0/1)	0.48 (0.50)	0.49 (0.50)	0.49 (0.50)	0.49 (0.50)	-0.013	0.006	0.002	0.730
Dutch (0/1)	0.64 (0.48)	0.64 (0.48)	0.61 (0.49)	0.60 (0.49)	0.005	0.026	-0.011	0.369
Single parent household (0/1)	0.19 (0.39)	0.20 (0.40)	0.20 (0.40)	0.20 (0.40)	-0.011	-0.006	-0.012	0.963
Income below 50th percentile	0.23 (0.42)	0.28 (0.45)	0.29 (0.45)	0.26 (0.44)	-0.012	0.014	0.014	0.342
Standardized test score	0.85 (0.54)	0.85 (0.52)	0.89 (0.51)	0.83 (0.56)	-0.001	-0.040**	-0.003	0.184
Test score missing	0.19 (0.39)	0.12 (0.32)	0.12 (0.33)	0.20 (0.40)	-0.001	0.001	-0.003	0.869
Characteristics of first-ranked school								
Assigned to 1st-rank school	0.00	0.00	0.00	1.00	X	X	X	
Probability assigned to 1st-rank school	0.67 (0.14)	0.61 (0.13)	0.59 (0.12)	0.75 (0.15)	0.000**	-0.000	0.000	0.146
Nr students same 1st school/prim. school	5.34 (4.15)	5.42 (4.36)	5.43 (4.24)	4.95 (4.22)	0.173	0.006	0.023	0.721
Nr students same track/1st school/prim. school	4.38 (3.60)	4.08 (3.40)	4.16 (3.39)	3.58 (3.14)	0.078	-0.125	-0.003	0.646
Home-school distance 1st-rank school (in km)	4.25 (3.40)	4.34 (3.45)	4.20 (3.08)	4.15 (3.21)	0.204*	0.039	-0.017	0.315
N	1,031	593	1,248	7,085				

Note: Columns (1) to (4) present means and standard deviations. Column (5) to (7) report the coefficients from regressions of each characteristic based on equation 2. Stars indicate whether the conditional differences in columns (5) to (7) are statistically significant. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table C5. Survey outcomes - details

	coeff	s.e.	mean
Homework			
Help with hw mentor	0.003	(0.028)	1.59
Help with hw other teachers	-0.024	(0.035)	2.39
Help with hw organized by school	-0.006	(0.026)	1.26
Help with hw from external	-0.016	(0.039)	1.66
Help with hw from parents	-0.042	(0.035)	3.07
Help with hw from others	-0.035	(0.034)	2.02
Attitudes toward school			
Importance of good grades	0.029	(0.023)	4.22
I do my best in school	0.042	(0.026)	3.91
Enjoy going to school	0.016	(0.031)	3.35
Feel safe in school	-0.019	(0.024)	4.22
Can be myself in school	-0.008	(0.026)	4.11
Education is important for a good life	0.017	(0.027)	4.22
Behavior inside school			
Skip class	-0.018	(0.022)	4.59
Late	-0.011	(0.031)	4.13
Expelled	-0.008	(0.024)	4.51
Behavior outside school			
Drink alcohol	0.002	(0.025)	3.47
Smoke cigarettes	-0.010	(0.021)	3.80
Use drugs	-0.007	(0.020)	3.78
Contact with police	-0.018	(0.016)	3.78
School satisfaction			
Satisfaction with life	0.023	(0.048)	7.83
Satisfaction with school	-0.118**	(0.055)	7.60
Satisfaction with class	0.062	(0.054)	7.52
Satisfaction with quality lessons	-0.041	(0.047)	7.08
Satisfaction with mentor	0.025	(0.065)	7.29
Political civic engagement			
Young people committed better world	0.014	(0.025)	4.00
Strike for climate	-0.102***	(0.031)	4.01
Social civic engagement			
Listen to others	0.054***	(0.021)	4.21
Redistribution	0.044	(0.029)	3.68
Diversity	0.056**	(0.026)	3.81
Personality traits			
Satisfied	0.040	(0.029)	4.07
Perseverant	0.034	(0.029)	3.94
Future	0.021	(0.026)	4.15
Risk	0.024	(0.033)	3.49
Self-confidence	0.024	(0.031)	3.79
Competition	-0.029	(0.035)	3.84
Procrastinate	-0.029	(0.032)	3.89
Time pressure	0.002	(0.036)	3.20

Note: Each row presents the coefficient, standard error and control mean from a separate regression of equation (1) where the variable indicated in the first column is the dependent variable. Robust standard errors in parentheses. The sample is the survey sample at risk (5,804 observations) but there is some item non-response with the lowest number of observations for "Future" (5,520). The average number of responses missing over all questions is 1.8%. *

Table C6. Heterogeneity

	Sex		SES		Parental background		Standardized test score	
	Males	Females	High SES	Low SES	non-Dutch	Dutch	below median	above median
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Enrolled top-1 in year 4	-0.763 (0.010)***	-0.767 (0.010)***	-0.782 (0.008)***	-0.704 (0.017)***	-0.735 (0.012)***	-0.783 (0.009)***	-0.695 (0.013)***	-0.809 (0.010)***
Admin outcomes								
On track (yr 5)	-0.030 (0.014)**	0.010 (0.012)	-0.010 (0.010)	-0.020 (0.024)	-0.012 (0.016)	-0.010 (0.012)	-0.013 (0.019)	-0.014 (0.013)
Science/health track	0.020 (0.016)	0.040 (0.016)**	0.029 (0.013)**	0.037 (0.027)	0.021 (0.019)	0.035 (0.015)**	0.035 (0.020)*	0.021 (0.016)
Exam on time on track	-0.000 (0.019)	-0.001 (0.018)	-0.006 (0.015)	0.014 (0.032)	0.007 (0.022)	-0.007 (0.017)	0.006 (0.022)	-0.007 (0.016)
Final exam GPA (1-10)	0.011 (0.035)	0.009 (0.037)	0.011 (0.028)	0.003 (0.062)	-0.011 (0.042)	0.022 (0.031)	0.006 (0.022)	-0.007 (0.016)
Final exam grade Dutch	-0.039 (0.036)	-0.015 (0.037)	-0.014 (0.028)	-0.051 (0.065)	-0.059 (0.043)	0.003 (0.032)	-0.012 (0.041)	-0.018 (0.033)
Final exam grade English	0.069 (0.043)	0.071 (0.044)	0.097 (0.034)***	-0.046 (0.079)	0.115 (0.051)**	0.045 (0.038)	0.047 (0.053)	0.098 (0.038)***
Final exam grade Math	-0.018 (0.0578)	0.022 (0.059)	0.003 (0.046)	-0.016 (0.105)	-0.054 (0.071)	0.037 (0.051)	-0.030 (0.067)	0.027 (0.053)
Enrolled in university	0.002 (0.020)	0.033 (0.020)	0.017 (0.016)	0.008 (0.034)	0.042 (0.024)*	0.000 (0.018)	0.010 (0.024)	0.019 (0.018)
Any crime	-0.000 (0.010)	0.008 (0.0087)	0.0065 (0.007)	-0.0016 (0.020)	-0.000 (0.011)	0.006 (0.008)	-0.011 (0.015)	0.014 (0.009)*
Survey outcomes								
Hours homework per wk	0.187 (0.227)	0.902 (0.270)***	0.502 (0.194)***	0.463 (0.473)	0.438 (0.314)	0.534 (0.213)**	0.667 (0.255)***	0.375 (0.256)
Help with homework	-0.021 (0.026)	-0.023 (0.025)	-0.026 (0.020)	-0.005 (0.045)	-0.019 (0.029)	-0.024 (0.023)	-0.039 (0.027)	0.006 (0.024)
Attitudes towards school	-0.018 (0.022)	0.045 (0.021)***	0.011 (0.017)	0.024 (0.040)	0.012 (0.024)	0.011 (0.020)	0.002 (0.022)	0.019 (0.021)
Parental awareness	0.029 (0.070)	-0.035 (0.074)	0.005 (0.056)	-0.026 (0.133)	0.037 (0.082)	-0.025 (0.065)	-0.001 (0.075)	0.004 (0.070)
Behavior inside school	-0.024 (0.028)	0.004 (0.025)	-0.004 (0.021)	-0.054 (0.050)	0.003 (0.030)	-0.022 (0.024)	-0.032 (0.028)	0.005 (0.026)
Behavior outside school	-0.024 (0.022)	0.003 (0.020)	-0.005 (0.017)	-0.042 (0.040)	-0.013 (0.023)	-0.013 (0.020)	-0.020 (0.021)	-0.002 (0.021)
School satisfaction	-0.023 (0.052)	0.006 (0.050)	-0.010 (0.040)	0.013 (0.096)	0.020 (0.059)	-0.023 (0.046)	-0.032 (0.056)	0.011 (0.047)
Political civic engagement	0.021 (0.034)	-0.058 (0.030)*	-0.044 (0.026)*	-0.032 (0.057)	-0.074 (0.038)**	-0.022 (0.030)	-0.041 (0.033)	-0.038 (0.033)
Social civic engagement	0.076 (0.026)***	0.031 (0.025)	0.051 (0.020)**	0.052 (0.045)	0.027 (0.030)	0.063 (0.023)***	0.063 (0.026)**	0.047 (0.026)*
Personality traits	-0.001 (0.023)	0.031 (0.024)	0.005 (0.019)	0.078 (0.045)*	0.046 (0.028)	-0.001 (0.022)	0.031 (0.025)	0.005 (0.023)
Nr of friends	-0.054 (0.068)	0.080 (0.054)	-0.006 (0.049)	0.062 (0.113)	0.115 (0.075)	-0.051 (0.055)	-0.068 (0.064)	0.077 (0.062)
Share friends fr. school	-0.008 (0.012)	-0.015 (0.011)	-0.013 (0.009)	-0.004 (0.022)	-0.012 (0.014)	-0.012 (0.010)	-0.002 (0.012)	-0.017 (0.011)
Share friends non-Dutch	-0.017 (0.016)	0.010 (0.016)	-0.009 (0.012)	0.012 (0.031)	0.003 (0.020)	-0.011 (0.013)	-0.019 (0.016)	0.005 (0.016)

Note: Each pair of coefficients in an odd and even numbered column come per row from a separate regression of equation (1) where the variable indicated in the first column is the dependent variable. The regression is augmented by including an interaction between D and the variable indicated in the even numbered column as well as the main effect of that variable. Robust standard errors in parentheses. The number of observations differs for each panel, but the shares in the admin sample are 0.49 female, 0.17 low-SES, 0.61 Dutch and 0.60 above-median test score. For column (7) and (8) students with a missing test score are dropped, which includes all applicants in the Covid year 2020. Effects on enrolled in top-1 school are significantly different from the other group for low-SES (higher), Dutch (lower) and above median test score (lower). Students with above median test scores have larger effects on switched schools. The only significant difference for the admin outcomes is that females have a larger effect for on track in year 5. Effects for the survey outcomes are significantly different for females for homework (higher), attitude towards school (higher) and number of friends (higher). Effects on personality traits are higher for low-SES, effects for number of friends are lower for Dutch. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C7. Balance table using 50 propensity score bins

	Not top-1 mean (SD) (1)	Top-1 mean (SD) (2)	Difference without bins (3)	Difference with bins (4)
Student characteristics				
Age (in years)	11.79 (0.39)	11.78 (0.40)	0.014	0.011
Female (0/1)	0.49 (0.50)	0.49 (0.50)	-0.006	0.003
Dutch (0/1)	0.63 (0.48)	0.60 (0.49)	0.025**	0.003
Single parent household (0/1)	0.20 (0.40)	0.20 (0.40)	-0.005	-0.007
Income below 50th percentile	0.26 (0.44)	0.26 (0.44)	0.002	0.006
Standardized test score	0.87 (0.52)	0.83 (0.56)	0.039***	-0.009
Test score missing	0.15 (0.35)	0.20 (0.40)	-0.050***	0.000
Characteristics of first-ranked school				
Assigned to 1st-rank school	0.00	1.00	X	X
Probability assigned to 1st-rank school	0.62 (0.14)	0.75 (0.15)	-0.123***	-0.000
Nr students same 1st school/prim. school	5.39 (4.23)	4.95 (4.22)	0.443***	0.114
Nr students same track/1st school/prim. school	4.23 (3.48)	3.58 (3.14)	0.651***	0.039
Home-school distance 1st-rank school (in km)	4.25 (3.27)	4.15 (3.21)	0.100	0.049
N	2,872	7,085		

Note: Columns (1) and (2) present means and standard deviations. Column (3) reports the difference between the means of columns (1) and (2). Column (4) reports the coefficients from regressions of each characteristic on an indicator for not being assigned to the top-1 school including controls for 50 bins of the propensity score of being assigned to the 1st-ranked school. Stars indicate whether the (conditional) differences in column (3) and (4) are statistically significant. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table C8. Balance table – Inverse probability weighting

	Not top-1 mean (SD) (1)	Top-1 mean (SD) (2)	Difference without α_s (3)	Difference with α_s (4)
Student characteristics				
Age (in years)	11.79 (0.39)	11.78 (0.40)	0.014	0.013
Female (0/1)	0.49 (0.50)	0.49 (0.50)	-0.006	0.006
Dutch (0/1)	0.63 (0.48)	0.60 (0.49)	0.025**	0.004
Single parent household (0/1)	0.20 (0.40)	0.20 (0.40)	-0.005	-0.022**
Income below 50th percentile	0.26 (0.44)	0.26 (0.44)	0.002	0.003
Standardized test score	0.87 (0.52)	0.83 (0.56)	0.039***	-0.010
Test score missing	0.15 (0.35)	0.20 (0.40)	-0.050***	-0.001
Characteristics of first-ranked school				
Assigned to 1st-rank school	0.00	1.00	X	X
Probability assigned to 1st-rank school	0.62 (0.14)	0.75 (0.15)	-0.123***	0.000**
Nr students same 1st school/prim. school	5.39 (4.23)	4.95 (4.22)	0.443***	0.131
Nr students same track/1st school/prim. school	4.23 (3.48)	3.58 (3.14)	0.651***	0.035
Home-school distance 1st-rank school (in km)	4.25 (3.27)	4.15 (3.21)	0.100	0.045
N	2,872	7,085		

Note: Columns (1) and (2) present (unweighted) means and standard deviations. Column (3) reports the (unweighted) difference between the means of columns (1) and (2). Column (4) reports the coefficients from regressions of each characteristic on an indicator for not being assigned to the first-ranked school and fixed effects for the first-ranked school, weighted with the inverse of the probability to be assigned to the first-ranked school. Stars indicate whether the (conditional) differences in column (3) and (4) are statistically significant. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table C9. Academic and admin outcomes – Inverse probability weighting

	coeff	s.e.	mean	N
In expected grade/track year 5	-0.007	(0.010)	0.61	9,957
Science or health track	0.026**	(0.012)	0.46	9957
Exam passed on time/track	0.007	(0.014)	0.61	6,554
Final exam GPA (1-10)	0.006	(0.026)	6.69	5,710
Final exam grade Dutch	-0.026	(0.027)	6.48	5,640
Final exam grade English	0.061*	(0.032)	7.31	5,624
Final exam grade Math	-0.021	(0.044)	6.88	5,552
Enrolled in university	0.016	(0.015)	0.53	4,920
Crime	0.007	(0.006)	0.04	9,957

Note: Each row presents the coefficient, standard error and control mean from a separate regression of equation (1) where the variable indicated in the first column is the dependent variable. Observations are weighted with the inverse of the probability to be assigned to the first-ranked school. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C10. Effects of not being assigned to first-ranked school on characteristics of school, teachers and peers - Survey sample

Assignment:	outside top-1 (1)	2nd ranked (2)	3rd ranked (3)	outside top-3 (4)	Contr mean
School characteristics					
Lower track available	0.237***	0.172***	0.202***	0.351***	0.09
	(0.012)	(0.015)	(0.022)	(0.023)	
Home-school distance	0.291***	0.294**	0.737***	0.090	4.10
	(0.101)	(0.140)	(0.216)	(0.143)	
School: total nr students	2.63	-9.88	-13.57	30.41**	902.3
	(7.05)	(8.89)	(13.34)	(13.98)	
School value added					
Final exam GPA (value added)	-0.012***	-0.003	0.015	-0.041***	0.01
	(0.005)	(0.006)	(0.009)	(0.009)	
Final exam grade (Dutch)	-0.039***	-0.040***	-0.018*	-0.049***	0.00
	(0.005)	(0.006)	(0.010)	(0.009)	
Final exam grade (English)	0.010**	-0.001	0.030***	0.017*	0.07
	(0.004)	(0.006)	(0.009)	(0.009)	
Final exam grade (Math)	-0.045***	-0.026*	-0.023	-0.088***	-0.00
	(0.010)	(0.013)	(0.019)	(0.018)	
Teacher characteristics					
Total experience since 2006	0.025	0.095***	0.212***	-0.200***	8.35
	(0.028)	(0.036)	(0.054)	(0.054)	
Experience at school since 2006	0.346***	0.305***	0.634***	0.233***	6.90
	(0.040)	(0.057)	(0.081)	(0.071)	
Year of birth	-0.600***	-0.578***	-0.978***	-0.397***	1972.03
	(0.062)	(0.085)	(0.132)	(0.112)	
Share female	0.012***	0.006***	0.006*	0.024***	0.53
	(0.002)	(0.002)	(0.003)	(0.003)	
Share Dutch	-0.017***	-0.009***	-0.019***	-0.027***	0.71
	(0.002)	(0.003)	(0.004)	(0.004)	
Level (scale 1-5, 5 best)	-0.006	0.030***	0.035**	-0.092***	3.19
	(0.008)	(0.010)	(0.015)	(0.015)	
Peers					
No of former classmates	-0.788***	-0.509***	-0.773***	-1.161***	3.22
(same track)	(0.077)	(0.113)	(0.156)	(0.112)	
Share low-income	0.053***	0.034***	0.047***	0.086***	0.26
	(0.003)	(0.004)	(0.006)	(0.006)	
Share Dutch	-0.054***	-0.045***	-0.053***	-0.068***	0.61
	(0.004)	(0.005)	(0.007)	(0.007)	
Mean test score	-0.180***	-0.101***	-0.138***	-0.321***	0.95
	(0.008)	(0.010)	(0.015)	(0.015)	
Share low-income in same track	0.028***	0.018***	0.025***	0.047***	0.25
	(0.003)	(0.004)	(0.005)	(0.006)	
Share Dutch in same track	-0.031***	-0.029***	-0.034***	-0.030***	0.62
	(0.004)	(0.004)	(0.007)	(0.008)	
Mean test score in same track	-0.017***	0.000	-0.009	-0.049***	1.04
	(0.003)	(0.003)	(0.005)	(0.005)	
N	5,804				

Note: Each cell in column (1) presents the coefficient of D from a separate regression of equation (1) where the variable indicated by the row entry is the dependent variable. The cells in columns (2)-(4) in each row present the coefficients of R^2, R^3 and $R^{>3}$ from a separate regression of equation (2) where the variable indicated by the row entry is the dependent variable. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C11. Academic and admin outcomes; Survey sample.

	outside top-1	2nd ranked	3rd ranked	outside top-3	Contr mean	N
	(1)	(2)	(3)	(4)		
In expected grade/track year 5	-0.012 (0.013)	-0.015 (0.018)	-0.032 (0.026)	0.010 (0.020)	0.78	5,804
Science or health track	0.044 (0.016)***	0.048 (0.022)**	0.037 (0.031)	0.046 (0.025)*	0.49	5,804
Exam passed on time/track	0.005 (0.016)	0.014 (0.023)	-0.018 (0.031)	0.001 (0.025)	0.66	4,541
Final exam GPA (1-10)	0.016 (0.031)	0.044 (0.043)	-0.018 (0.064)	-0.001 (0.047)	6.74	4,086
Final exam grade Dutch	-0.035 (0.032)	-0.027 (0.045)	-0.008 (0.062)	-0.071 (0.050)	6.49	4,084
Final exam grade English	0.073 (0.038)*	0.067 (0.052)	0.052 (0.074)	0.064 (0.060)	7.32	4,076
Final exam grade Math	0.058 (0.051)	0.100 (0.069)	0.141 (0.105)	0.001 (0.083)	6.94	4,047
Enrolled in university (value added)	0.013 (0.018)	0.046 (0.025)*	0.041 (0.034)	-0.044 (0.028)	0.57	3,255
Crime	-0.002 (0.007)	0.007 (0.011)	-0.031 (0.010)***	0.003 (0.011)	0.04	5,804

Note: Each cell in column (1) presents the coefficient of D from a separate regression of equation (1) where the variable indicated by the row entry is the dependent variable. The cells in columns (2)-(4) in each row present the coefficients of R^2, R^3 and $R^{>3}$ from a separate regression of equation (2) where the variable indicated by the row entry is the dependent variable. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C12. Survey outcomes – weighted by inverse probability of survey response

	coeff	s.e.	mean
Hours homework per week	0.506***	(0.183)	7.48
Help with homework	-0.022	(0.019)	2.02
Attitudes towards school	0.011	(0.016)	4.00
Parental awareness	-0.002	(0.052)	8.46
Behavior inside school	-0.012	(0.019)	4.41
Behavior outside school	-0.011	(0.016)	3.70
School satisfaction	-0.008	(0.037)	7.44
Political civic engagement	-0.042*	(0.024)	4.00
Social civic engagement	0.051***	(0.019)	3.90
Personality traits	0.017	(0.018)	3.45
Total nr friends (max 6)	0.008	(0.045)	5.37
Share friends from school	-0.012	(0.008)	0.68
Share friends non-western name	-0.003	(0.012)	0.24
N	5,804		

Note: Each row presents the coefficient, standard error and control mean from a separate regression of equation (1) where the variable indicated in the first column is the dependent variable. Observations are weighted with the inverse of the propensity score of having responded to the survey. This propensity score is based on a logit regression of an indicator of response on the interacted observable characteristics female, Dutch, low income, switched school by 2019 and the interaction of the first-ranked school and the placement rank (1, 2, 3, 3+). Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C13. Survey outcomes; indices constructed using the procedure of Anderson (2008)

	coeff	s.e.	mean
Help with homework	-0.018	(0.017)	0.02
Attitudes towards school	0.014	(0.019)	0.01
Behavior inside school	-0.016	(0.024)	0.01
Behavior outside school	-0.024	(0.024)	0.02
School satisfaction	0.008	(0.021)	0.02
Political civic engagement	-0.041	(0.027)	0.02
Social civic engagement	0.066***	(0.023)	-0.01
Personality traits	0.009	(0.016)	-0.01
N	5,804		

Note: Each row presents the coefficient, standard error and control mean from a separate regression of equation (1) where the variable indicated in the first column is the dependent variable. There is some item non-response, with the lowest number of observations (5,732) for the index on behavior outside school. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C14. Academic and admin outcomes, standard errors clustered at level of assigned school

	coeff	s.e.	mean	N
In expected grade/track year 5	-0.011	(0.008)	0.60	9,957
Science or health track	0.030***	(0.011)	0.46	9,957
Exam passed on time/track	-0.002	(0.013)	0.61	6,554
Final exam GPA (1-10)	0.010	(0.035)	6.70	5,710
Final exam grade Dutch	-0.024	(0.026)	6.48	5,707
Final exam grade English	0.070*	(0.036)	7.34	5,690
Final exam grade Math	0.004	(0.070)	6.88	5,617
Enrolled in university	0.016	(0.017)	0.52	4,920
Crime	0.004	(0.006)	0.04	9,957

Note: Each row presents the coefficient, standard error and control mean from a separate regression of equation (1) where the variable indicated in the first column is the dependent variable. Clustered standard errors on assigned school. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C15. Academic and admin outcomes controlling for 50 propensity score dummies

	coeff	s.e.	mean	N
In expected grade/track year 5	-0.009	(0.011)	0.60	9,957
Science or health track	0.029**	(0.012)	0.46	9,957
Exam passed on time/track	-0.000	(0.014)	0.61	6,554
Final exam GPA (1-10)	0.006	(0.026)	6.70	5,710
Final exam grade Dutch	-0.018	(0.026)	6.48	5,707
Final exam grade English	0.075***	(0.032)	7.34	5,690
Final exam grade Math	-0.005	(0.043)	6.88	5,617
Enrolled in university	0.024	(0.016)	0.52	4,920
Crime	0.003	(0.007)	0.04	9,957

Note: Each row presents the coefficient, standard error and control mean from a separate regression of equation (1) where the variable indicated in the first column is the dependent variable. Instead of controls for first-ranked school fixed effects, include 50 bins for propensity scores* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C16. Other outcomes excluding schools surveyed after Covid

	coeff	s.e.	mean	N
Hours homework per week	0.516***	(0.187)	7.38	5459
Help with homework	-0.015	(0.019)	2.01	5534
Attitudes towards school	0.027*	(0.016)	4.01	5528
Parental awareness	0.003	(0.054)	8.49	5501
Behavior inside school	-0.007	(0.020)	4.41	5509
Behavior outside school	-0.001	(0.016)	3.71	5470
School satisfaction	0.038	(0.038)	7.48	5504
Political civic engagement	-0.044*	(0.025)	4.01	5505
Social civic engagement	0.055***	(0.019)	3.90	5504
Personality traits	0.024	(0.018)	3.45	5500
Total nr friends (max 6)	-0.000	(0.047)	5.38	5490
Share friends from school	-0.019	(0.008)	0.68	5321
Share friends non-western name	0.000	(0.012)	0.24	5306

Note: Each row presents the coefficient, standard error and control mean from a separate regression of equation (1) where the variable indicated in the first column is the dependent variable. Excluding respondents at schools surveyed after March 2020 or whose first-ranked school was surveyed after March 2020. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.