

WORKING PAPER N° IDB-WP-01647

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October 2024



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**Cataloging-in-Publication data provided by the
Inter-American Development Bank**

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Shifting perceptions in school choice: the impact of presenting high-quality schools first in Recife's centralized admission system / Gregory Elacqua, Macarena Kutscher, Mateus Rodrigues, Danielle Nascimento.

p. cm. — (IDB Working Paper Series ; 1647)

Includes bibliographic references.

1. School choice-Brazil. 2. Public schools-Brazil. 3. Education-Research-Brazil. I. Elacqua, Gregory M., 1972- II. Kutscher, Macarena. III. Rodrigues, Mateus. IV. Nascimento, Danielle. V. Inter-American Development Bank. Education Division. VI. Series.

IDB-WP-1647

Keywords: school choice, centralized admission system, information intervention, educational inequality

JEL Codes: A20, D12, I24, C93, H75

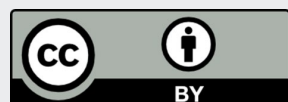
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Shifting Perceptions in School Choice: The Impact of Presenting High-Quality Schools First in Recife’s Centralized Admission System

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October 27, 2024

Abstract

The potential efficacy of centralized school choice systems in reducing inequalities in access to high-quality schools may be hindered by informational frictions. In this paper, we experimentally evaluate a low-cost information intervention in the centralized school admission system (*Matrícula Digital*) of Recife, Brazil. The intervention modified how school vacancies were initially displayed on the application platform: the treatment group first saw schools listed by quality; the control group first saw them ordered by proximity to the student’s home, i.e., the default order. We focus on students applying to first grade, the level with the highest participation rate since all pupils entering the municipal school system must go through this process. We find no overall effect of the school ordering change on the quality of the schools selected. However, when we restrict our analysis to students who live near at least one of the top three schools on the list, we observe a significant positive effect. This effect weakens as distance from home increases. Our findings indicate the importance of school quality in relation to proximity to the student’s residence. This conclusion is supported by a parental survey conducted after admissions, in which 80% of respondents indicated that proximity was the most important factor in their school choice. These results have considerable implications for the design of effective educational information interventions.

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1 Introduction

To improve transparency, equity, and efficiency, many school systems worldwide have implemented centralized student admission systems (Elacqua et al., 2021). These systems post school vacancies on an online platform, allowing families to rank their preferences. An algorithm then assigns students to schools based on these rankings and local policy objectives. While governments often assume that families have sufficient information about local schooling options to make informed decisions, evidence suggests otherwise. Research indicates that many families lack detailed information and, when provided with more specific data on schools, tend to choose higher performing institutions (Allende et al., 2019; Hastings and Weinstein, 2008).

Moreover, not all families face the same information barriers. Low-income families in particular have more difficulty accessing academic performance data (Hastings and Weinstein, 2008; Ajayi, 2022). The decision-making process is complex, with many families relying on advice from social networks or personal experiences. Additionally, preferences for school attributes vary by socio-economic status (SES), with lower-SES families often prioritizing proximity over academic quality (Hastings and Shapiro, 2009; Elacqua and Kutscher, 2023). This undermines the potential of centralized school choice systems to reduce inequalities, as disadvantaged families frequently end up choosing lower-quality schools (Ajayi, 2022).

Studies reveal that the way information is presented in centralized assignment systems can significantly influence choices (Ajzenman et al., 2021). This suggests that even subtle changes in how options are structured—commonly referred to as “nudges”—can help families make more informed decisions. These nudges are particularly relevant when families face numerous options, as choice overload may impede their ability to choose optimally (Iyengar, 2010; Iyengar and Lepper, 2000; Augenblick and Nicholson, 2016).

This paper investigates the impact of a nudge in a centralized school admission system in Recife, Brazil, aimed at encouraging families to select higher-quality schools. Specifically, we conducted a large-scale experiment on the city’s online school admission platform. Since 2022, families applying to municipal schools have used this platform to choose and rank their preferences. In our experiment, we altered the order in which the schools were presented: the treatment group first saw schools listed by quality, while the control group first saw them ordered by proximity, the local government’s default.¹ Families could toggle between the views (quality vs. proximity) using a button at the top of the list. Thus, we modified only the initial display of options, aiming to nudge families toward higher-quality schools without restricting their choices.

We examine the entire cohort of students participating in the admission system, with a focus on those

¹School quality was measured using the IDEB index (*Índice de Desenvolvimento da Educação Básica*), which evaluates the effectiveness of basic education in Brazil on a scale from 0 to 10. The IDEB measures educational quality through standardized test scores and student promotion rates. These scores are publicly available and regularly disseminated to families by educational authorities.

enrolling in the first grade as this is the primary entry point into formal public education.² When a family enrolls a child in the first grade, they are guaranteed a spot in the assigned school and system up through the ninth grade, thus encompassing all of primary education. The wide availability of vacancies at this level allows for a more accurate assessment of parental preferences, without the constraints of limited slots.

Parents enrolling their children for the first time may also be more receptive to suggestions for higher-quality schools. In contrast, families applying for upper grades often have different motivations, such as needing to repeat a grade or relocate to a new neighborhood. Additionally, the municipal system exclusively covers grades one to five, while state schools also manage grades five to nine, offering alternatives outside the centralized system that are not included in this study.

Our analysis reveals no overall impact of initial school ordering on the quality of schools selected. However, when we focus on the treatment group (schools ordered by quality) and restrict the analysis to students living near at least one of the top three schools, we observe a significant positive effect for families with children entering the first grade, which diminishes as distance from home increases. These findings suggest that school quality is an significant factor for families, particularly when higher-quality schools are located near their residence. This conclusion is further supported by a parent survey conducted a few months after the admission process, in which 80% of participants identified proximity to home as their top priority in school selection.

The results highlight the importance of aligning interventions with user context and preferences. Emphasizing high-quality schools may prove effective only when such recommendations resonate with what families deem "relevant." In this case, a strong preference for proximity, especially for primary schools, suggests that schools located farther than 4 or 5 kilometers away may not be appealing to families.

This paper contributes to the literature in several ways. First, it adds to the limited body of work on digital nudges in high-stakes decision-making. Digital nudges can be implemented through mechanisms like altering default choices, where users tend to stick with preselected options (Weinmann et al., 2016; Caraban et al., 2019), or by changing how choices are presented, such as reordering options (Ajzenman et al., 2021; Caraban et al., 2019; Sunstein, 2016). Nudges in centralized school admission systems have primarily been studied in offline settings (Hastings and Weinstein, 2008; Ajayi, 2022; Allende et al., 2019). Online interventions, however, may have a greater impact on decisions since families receive recommendations in real-time while navigating the platform. This is particularly relevant in the context of Recife, where the admission process prior to 2022 operated on a first-come, first-served basis, leading

²Offering kindergarten and preschool education in Recife, and in Brazil more broadly, remains challenging for the public education system. In 2013, the Ministry of Education mandated preschool education for children aged 4 and 5, reflecting a recent push for universal early childhood education. However, the specific pedagogical needs and high demand outstrip supply. Efforts to address this situation include expanding vacancies, leveraging private community school spots (*escolas comunitárias*), and planning new schools. Despite these efforts, vacancy shortages persist, leading to a distinct set of assignment rules for early education, where students are ranked and assigned based on scores that incorporate parental preferences. Each school also organizes waiting lists based on these scores.

to rushed decisions. This is evidenced by the fact that in 2022—the inaugural year of the new *Matrícula Digital*, platform users still spent an average of just three minutes making their selections despite no longer needing to make a quick choice to obtain a vacancy.

Second, this study intersects with research examining the impact of school information provision on school choice. In our experiment, we highlight school quality, a factor that may not always be readily apparent to families. Research suggests that providing school quality information can lead parents to reconsider their choices (Valant and Weixler, 2022). Families often base their decisions on easily accessible information, and their perception of school quality can shift when performance metrics are made available. For example, in England, Allen and Burgess (2013) demonstrate that providing detailed school performance data significantly influences parental preferences, encouraging families to prioritize higher-quality schools. Similarly, Koning and van der Wiel (2013) observe that school quality rankings in the Netherlands affect parental decision-making, thus illustrating how information dissemination can alter school choice patterns. These findings suggest that both the presentation and availability of performance data are crucial to school selection processes.

The type and format of the quality information provided may further influence parental decisions. Neilson et al. (2019) argue that families are more likely to choose higher-performing schools when they are informed about what school quality entails, including specifics such as standardized test scores and promotion rates. Such studies stress the importance of not only presenting school quality information but also ensuring that it is clear and meaningful to parents, especially in contexts where such data may not be readily understood.

The findings of our study have significant implications for national and local government officials and policymakers endeavoring to promote educational equity through informed school choices. We demonstrate that, under certain conditions—specifically, when high-quality schools are located within a reasonable distance of students’ homes—changing the order of school listings to first present high-quality options can positively impact school selection. This low-cost intervention has the potential to benefit families facing information barriers. However, we also find that this “nudge” is effective only when there is a sufficient supply of high-quality schools within reasonable proximity. Therefore, providing information alone is not enough to shift parental preferences; it is also essential to ensure an adequate supply of geographically accessible high-quality schools.

2 Institutional Background

The educational system in Brazil is governed by the Ministry of Education (*Ministério da Educação*) and is subject to federal, state, and municipal regulations as per the National Educational Bases and Guidelines Law (*Lei de Diretrizes e Bases da Educação*). Municipal governments primarily manage

daycare, kindergarten, and primary education. However, in Recife and elsewhere, state and municipal authorities often jointly handle primary education, particularly grades five to nine. High school falls under state jurisdiction.

Recife, the capital of the state of Pernambuco, is among the smallest capitals in terms land area. It is, however, one of the most densely populated cities in Brazil. It is also marked by significant poverty, with nearly 20% of the metropolitan area’s residents living in *favelas*, or informal settlements. In 2021, the average per capita household income in Recife was just above the minimum wage. In 2023, over 600,000 residents, representing 34.4% of the city’s population, were enrolled in *Cadastro Único*, the government program for low-income families. Educational attainment is generally low, with adults aged 25-39 averaging 12.2 years of schooling, and those 40 and older less than 11.

Recife’s education sector includes municipal, state, and private schools.³ The 2022 Brazilian Educational Census reported 177,163 primary school students. Of these, 241 municipal schools represent 38.3% of enrollments. State schools enroll 21.2% of primary students across 85 institutions, while 564 private schools make up 40.1% of enrollments.

Previously, Recife had used an online admission system that allocated slots on a first-come, first-served basis, a method fraught with inefficiencies and inequities, such as a parent’s ability to connect to the system and choose a vacancy quickly. In response, the Secretary of Education introduced a revamped centralized admission system to address these issues.

2.1 *Matrícula Digital* Policy

Specifically, Recife’s Secretary of Education launched *Matrícula Digital* in 2022, a centralized system for assigning students to municipal schools, covering both primary education and youth and adult education (EJA). Families apply online and rank their preferred schools. A deferred-acceptance algorithm then assigns students to the highest-ranked school possible based on availability and the policy priorities set by the Secretary. If a student isn’t placed during the initial phase, they can reapply in a subsequent round. Urban applicants must list at least three school choices, while rural applicants need to list only one.

The system prioritizes assignments based on several criteria: residency in Recife, siblings at the same school, students with disabilities or special needs, government custody (including foster housing or any other program designed to provide care and supervision for the student), whether the student’s family is registered in CadÚnico, and proximity to home.⁴ The highest priority is given to the first criterion, followed by subsequent ones in order. If applicants share the same priority level, secondary criteria or closer home proximity determine the selection.

Crucial to preventing multiple applications per family, Brazil has required a Natural Persons Register

³There are also federal schools, but their enrollments represent only 0.4% of the city’s enrollment.

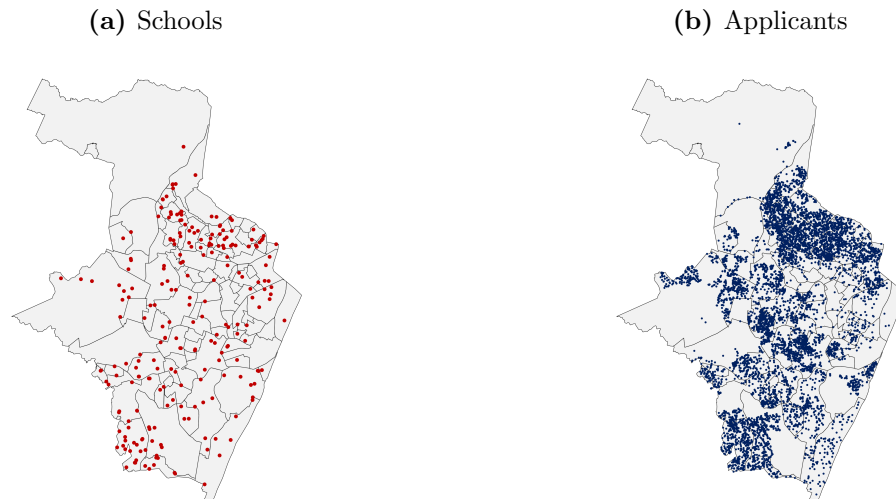
⁴CadÚnico is a national database of low-income families who are granted access to social programs and assistance.

(*Cadastro de Pessoas Físicas - CPF*) identifier on birth certificates since 2017, thus ensuring a unique ID for children born from 2018 onwards. For children born earlier, a CPF registration campaign was carried out by the Secretary of Education (see [Figure A1](#) in the Appendix).

Applications were accepted from November 29 to December 19, 2022, allowing for adjustments. Assignments were then announced on December 23, followed by a 10-day confirmation period before a second round allowing for applications for remaining vacancies. This paper focuses solely on the first round.

[Figure 1](#) illustrates the spatial distributions of schools with available vacancies and the applicants for the 2022 admission process. As anticipated, the number of applicants is positively correlated with the number of municipal schools having available vacancies. This figure further highlights that the majority of applicants and participating municipal schools are located in Recife's less affluent neighborhoods.

Figure 1: Schools and applicants in Recife



Note: Panel 1a displays the spatial distribution of schools that offered vacancies in the 2022 admission process. Panel 1b illustrates the spatial distribution of applicants in Recife. The internal boundaries of the maps correspond to the neighborhoods in Recife.

3 Experimental Design

The 2022-2023 admission process for municipal schools in Recife involved an experiment with 10,378 students from the first to ninth grades seeking enrollment in the municipal system. Students applied for school vacancies on an online platform, starting by completing a form with their personal details, priorities for allocation (e.g., special needs), and home address. The platform then requested information about the desired level of education and school shift (morning, afternoon, or full-time), displaying available vacancies based on these inputs.

In this experiment, we altered the presentation order of school vacancies without restricting the information available to families. Based on schooling level, grade, and shift, each applicant was assigned to a treatment or control group. In the treatment group, vacancies first appeared listed by school quality (according to a national school quality index, the IDEB), while in the control group, they first appeared listed by school proximity to the student’s home—the default option set by the local government. Applicants could switch between the two views by clicking a button at the top of the list. By default, all schools with available vacancies were displayed within a 10 km radius of the reference address. The system made exceptions only if the parent(s) lived in a remote area, in which case the radius was extended to include additional schools. This was a political decision, as the municipality does not provide student transportation.

The intervention is based on previous studies demonstrating “order effects,” or the fact that the sequence in which options are presented can influence decision-making (Feenberg et al., 2017; Turland et al., 2015; Kammerer and Gerjets, 2014; Levav et al., 2010). In the context of a centralized assignment process, Ajzenman et al. (2021) investigate order effects in a teacher selection process in Ecuador. By experimentally changing the order of school vacancies on the application platform to prioritize hard-to-staff schools, the authors successfully reduced teacher sorting, promoting a more equitable distribution of qualified teachers across schools. Given these results, order effects may mitigate disparities in school choices, ultimately contributing to a more equitable distribution of educational opportunities.

Families in Recife, and throughout the Pernambuco region, are accustomed to quality education indexes. Both state and municipal governments emphasize the importance of learning achievement. In particular, Recife’s Department of Education hosts the Education Highlights Award (*Prêmio Destaques da Educação*), which celebrates the city’s top-performing schools. Additionally, Recife offers an incentive for teachers who meet learning goals in the national index (IDEB) and the local index (IDEPE), called the Education Performance Bonus (*Bônus Desempenho Educacional*). These initiatives have made both the national IDEB and the local IDEPE widely recognized and culturally significant.

3.1 Parental Survey

To gain further insights into the decision-making of families, we conducted an online survey with all participants of the admission process. This survey was distributed by local authorities via WhatsApp a few months after the end of the admissions period. Given the extensive use of WhatsApp among families in Recife, this method achieved wider reach than would have been possible through email. It’s important to note that the survey responses may be biased, as they were collected after parents knew their children’s final school placements. We provide a detailed analysis of the survey findings in the Appendix, [subsection A0.4](#).

Since the survey cannot be linked to specific applicants, we focused on questions related to user experience with the platform, preferences, and socioeconomic background. The survey gathered 2,248 responses, representing 25.4% of the total number of parents.

Notably, around 30% of the parents reported having obtained less than a high school degree, indicating a relatively lower level of education within the surveyed population. Indeed, the percentage of individuals aged 25 or older⁵ who did not complete high school in the Recife population as a whole is almost 11%.⁶ Additionally, it should be highlighted that the vast majority of survey respondents (84%) were mothers of the students.

The insights gathered from the survey responses are instrumental for understanding and contextualizing the results obtained from the experiment, identifying its limitations, and recognizing its strengths. The survey findings will moreover inform the design of a more effective intervention for the forthcoming year.

4 Data

Firstly, we utilized information from the *Matrícula Digital* process, which provides details on student applications and school vacancies. Specifically, for every student who participated in the program, we have data on their ranked school preferences, vulnerability status, special needs requirements, institutionalization status, grade level, and self-reported priorities.

Our second source of data consists of administrative records from municipal schools, used to determine their quality level. These records were obtained from the Secretary of Education (*Secretaria de Educação e Esportes de Pernambuco*), the entity responsible for compiling the IDEB index. We also incorporated information from the 2010 Brazilian Census to ascertain the average income level in the census tracts and neighborhoods of the applicants.⁷

4.1 Descriptive Statistics

The original dataset, before undergoing any data cleaning, comprised 11,347 applicants. After excluding adult education applicants, this number declined to 10,792. Further exclusions were applied for those living outside Recife, those who submitted more than 10 applications,⁸ and individuals applying to schools more

⁵We assume that this group of individuals is representative of the parents' age.

⁶This percentage was calculated using data from the Brazilian National Continuous Household Sample Survey (*Pesquisa Nacional por Amostra de Domicílios Contínua Anual, PNADCA* of 2022).

⁷To this end, we considered the average income of all individuals over the age of ten.

⁸The vast majority (99.5%) of the students applied to less than 10 schools. Additionally, the first schools listed by the parents are those that should reflect their preferences most strictly. This is confirmed by the post-application survey available in Appendix A0.4, where most parents indicated that they requested vacancies in non-preferable schools solely to fulfill the minimum number of schools required by the system.

than 20 km away, further reducing the sample to 10,378 applicants. After dropping all students with missing information, the final count is 9,459 applicants.⁹

Table 1 presents a descriptive summary of our baseline sample. Of these applicants, 56% are enrolled in CadÚnico, while less than 5% reported having special needs, and only 1% are under government custody. The majority of the sample, over 70%, consists of students in the initial years of education. This aligns with expectations, given that the State also provides education for the final years (middle school). Regarding school shift, most students apply to either the morning or afternoon shift. The average quality rating of the schools applied to is 4.7 on a 0 to 10 scale. Additionally, the average walking distance to the listed schools is 2.1 kilometers, and students, on average, listed 3.7 schools in their applications.

Table 1: Descriptive statistics of students baseline characteristics and outcomes

	Mean	Std. Deviation	Min.	Max.
<i>Students characteristics</i>				
Vulnerable	0.558	0.497	0.00	1.000
Special needs	0.047	0.212	0.00	1.000
Institutionalized students	0.011	0.106	0.00	1.000
<i>Grade</i>				
Initial years	0.737	0.440	0.00	1.000
Final years	0.263	0.440	0.00	1.000
<i>Shift</i>				
Morning	0.432	0.495	0.00	1.000
Afternoon	0.467	0.499	0.00	1.000
Full-time	0.101	0.301	0.00	1.000
<i>Outcomes</i>				
Quality	4.746	0.704	3.24	7.880
Walking distance (km)	2.147	2.501	0.00	19.724
# applications	3.700	1.309	1.00	10.000

Note: This table displays the mean, standard deviation, minimum, and maximum of students' baseline characteristics and outcomes. It also provides statistics for the proportion of students in each grade and shift group.

Every student entering the education system and applying for a vacancy in a municipal school is required to participate in the centralized admission process. Consequently, applicants seeking admission to the first grade represent the highest proportion of applicants, as illustrated in Figure 2a and further supported by the data in Table 2. The first grade also has the highest number of vacancies within the system.

The availability of a greater number of vacancies at this entry level allows for a more accurate assessment of parental preferences, free from the constraints of limited slot availability. We accordingly focus our analysis predominantly on these applicants. Parents enrolling their children for the first time are also potentially more receptive to recommendations for higher-quality schools. In contrast, families applying

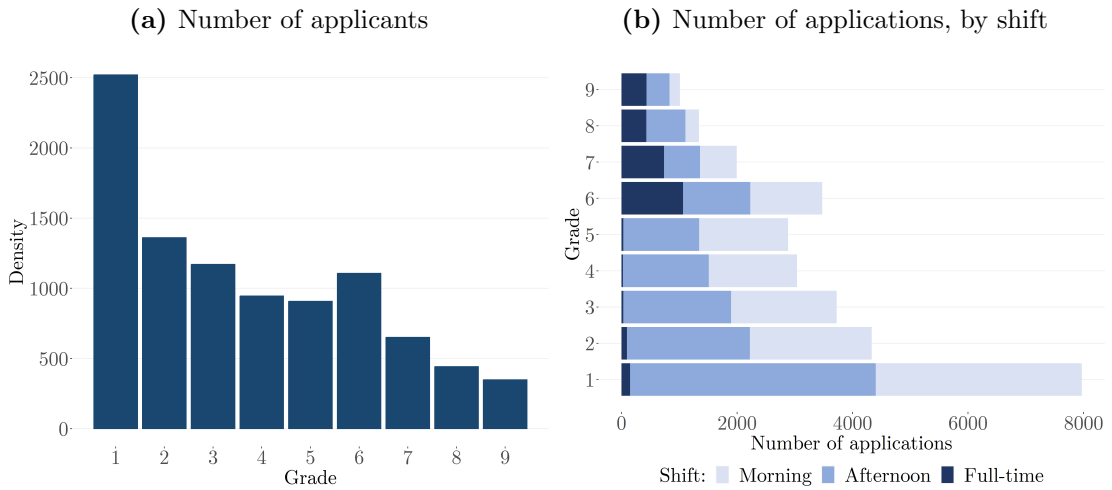
⁹Note that, of the 236 schools participating in the admission system, 25 lacked IDEB data.

for higher grades often have different motivations, such as repeating a grade or relocating to a different neighborhood. Moreover, while the first to fifth grades are the exclusive responsibility of the municipality, the state government also provides education from the fifth to ninth grades. Therefore, families seeking admission for the latter grades have alternative public school options outside the centralized system, which are not included in this experiment.

Note that not all students apply to first grade through the *Matricula Digital* process. Students already enrolled in municipal preschools can automatically advance to first grade, bypassing the centralized admission system. This may affect the external validity of our results, as families with children already in preschools may differ from those enrolling their children directly into first grade. Unfortunately, we do not have data to assess this potential issue.

In Recife, preschool coverage is approximately 75%, with over 50% of enrollment provided by the private sector. This aligns with evidence from greater Brazil, which suggests that families with children in preschools tend to be more economically advantaged, either through access to private institutions or early enrollment in public education (de Barros et al., 2006; Menezes-Filho et al., 2024; de Barros et al., 2011). The generalizability of our findings may consequently be limited, as families enrolling their children for the first time in first grade may have different expectations and experiences compared to those already familiar with the education system.

Figure 2: Descriptive statistics, by grade



Note: Panel 2a shows the number of applicants by grade. Panel 2b illustrates the number of applications by grade, segmented by shift.

Figure 2b shows the distribution of applicants by shift (morning, afternoon, and full-time). The application patterns, for the initial and final years respectively, display a consistent trend across grades. Students in the early years predominantly opt for either the morning or afternoon shifts, whereas in the

Table 2: Percentage of schools, vacancies and applicants, by grade and shift

Grade	Morning		Afternoon		Full-Time	
	Vacancies	Applicants	Vacancies	Applicants	Vacancies	Applicants
1 st	54.9%	44.4%	41.7%	53.3%	3.4%	2.2%
	(1,673)	(1,134)	(1,273)	(1,361)	(1,04)	(57)
2 nd	60.3%	48.6%	38.4%	48.6%	1.3%	2.8%
	(593)	(666)	(377)	(666)	(13)	(38)
3 rd	53.1%	48.3%	43.8%	50.8%	3.2%	0.9%
	(536)	(570)	(442)	(599)	(32)	(11)
4 th	51.7%	50.4%	45.3%	48.4%	3.0%	1.2%
	(475)	(478)	(416)	(459)	(28)	(11)
5 th	49.3%	52.4%	47.5%	45.7%	3.3%	2.0%
	(438)	(478)	(422)	(417)	(29)	(18)
6 th	32.6%	35.8%	44.4%	33.8%	23.0%	30.4%
	(105)	(399)	(143)	(377)	(74)	(339)
7 th	24.2%	32.1%	52.8%	31.2%	23.0%	36.8%
	(79)	(210)	(172)	(204)	(75)	(241)
8 th	8.5%	17.6%	59.8%	50.5%	31.7%	32.0%
	(21)	(78)	(147)	(224)	(78)	(142)
9 th	3.2%	22.5%	60.2%	37.3%	36.7%	40.2%
	(8)	(79)	(151)	(131)	(92)	(141)

Note: This table displays the percentage of vacancies and the percentage of applicants during *Matrícula Digital*, broken down by grade. The percentage of vacancies is calculated based on the total vacancies for each grade.

final years there is also a notable preference for full-time shifts.

In Figure 4, we examine the application trends by grade, distinguishing between first-grade applicants, subsequent initial years applicants, and final years applicants. Figure 4a shows that the distribution of applications in relation to school quality is largely centered around zero standard deviations. This trend is especially evident among first-grade and initial-years applicants. A closer examination of the quality of the top-choice school for each applicant reveals a notable clustering at the higher end of the quality spectrum. This suggests that school quality plays a critical role in determining the first preference.

Regarding distance from home, Figure 4c and Figure 4d show that for first grade and the subsequent initial years, the majority of applications were for schools located within 3 km of the student’s residence. In contrast, families with children in the final years tend to consider schools that are farther from home.

Furthermore, Figure 4e reveals a distinct trend in the number of applications, influenced by a rule defined by the Secretary of Education that requires families to list at least three schools. This policy, while intended to broaden options, may inadvertently decrease the efficiency of the process by forcing families to apply to schools they are not genuinely interested in. Supporting this, our survey found that 74.7% of parents reported applying to at least one school they did not prefer, solely to meet this three-school requirement.

In regard to the experiment, Table 3 compares students’ characteristics across the treatment and

control groups. As expected, due to the initial randomization, there are no significant differences in the characteristics of students between the two groups. This includes no statistically significant differences in the percentage of students enrolled in CadÚnico, those with special needs, those who are institutionalized, or those seeking admission into either the initial or final years.

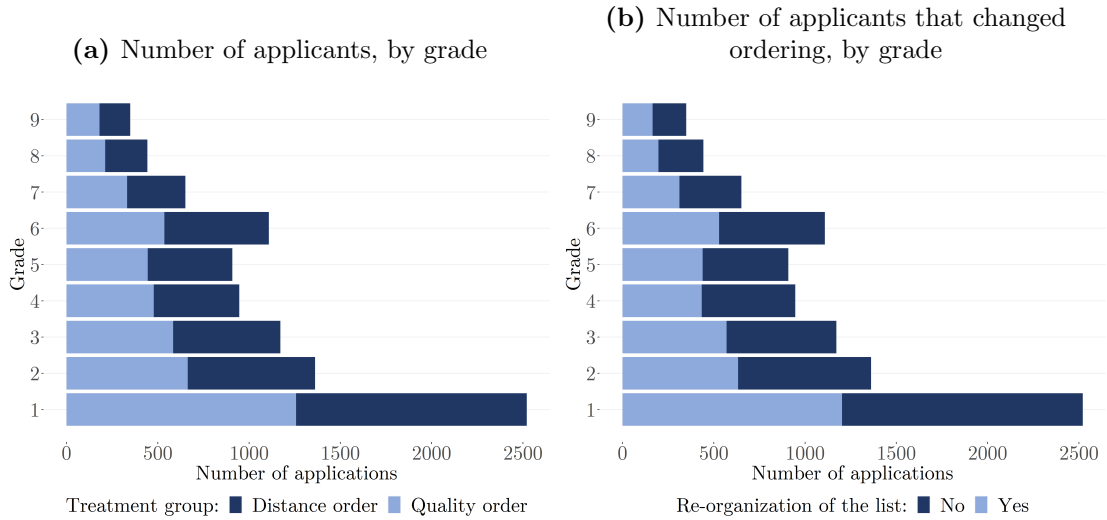
Table 3: Balance between the treatment and control groups: baseline characteristics

	Treated		Control		p-value
	Mean	Std. Deviation	Mean	Std. Deviation	
Vulnerable	0.560	0.496	0.551	0.497	0.342
Special needs	0.045	0.208	0.046	0.210	0.829
Institutionalized students	0.012	0.108	0.011	0.106	0.854
Initial years	0.731	0.443	0.730	0.444	0.859
Final years	0.269	0.443	0.270	0.444	0.859

Note: This table displays the mean and standard deviation of baseline characteristics for both the treated and control groups. The p-value is determined through a t-test of the differences in means.

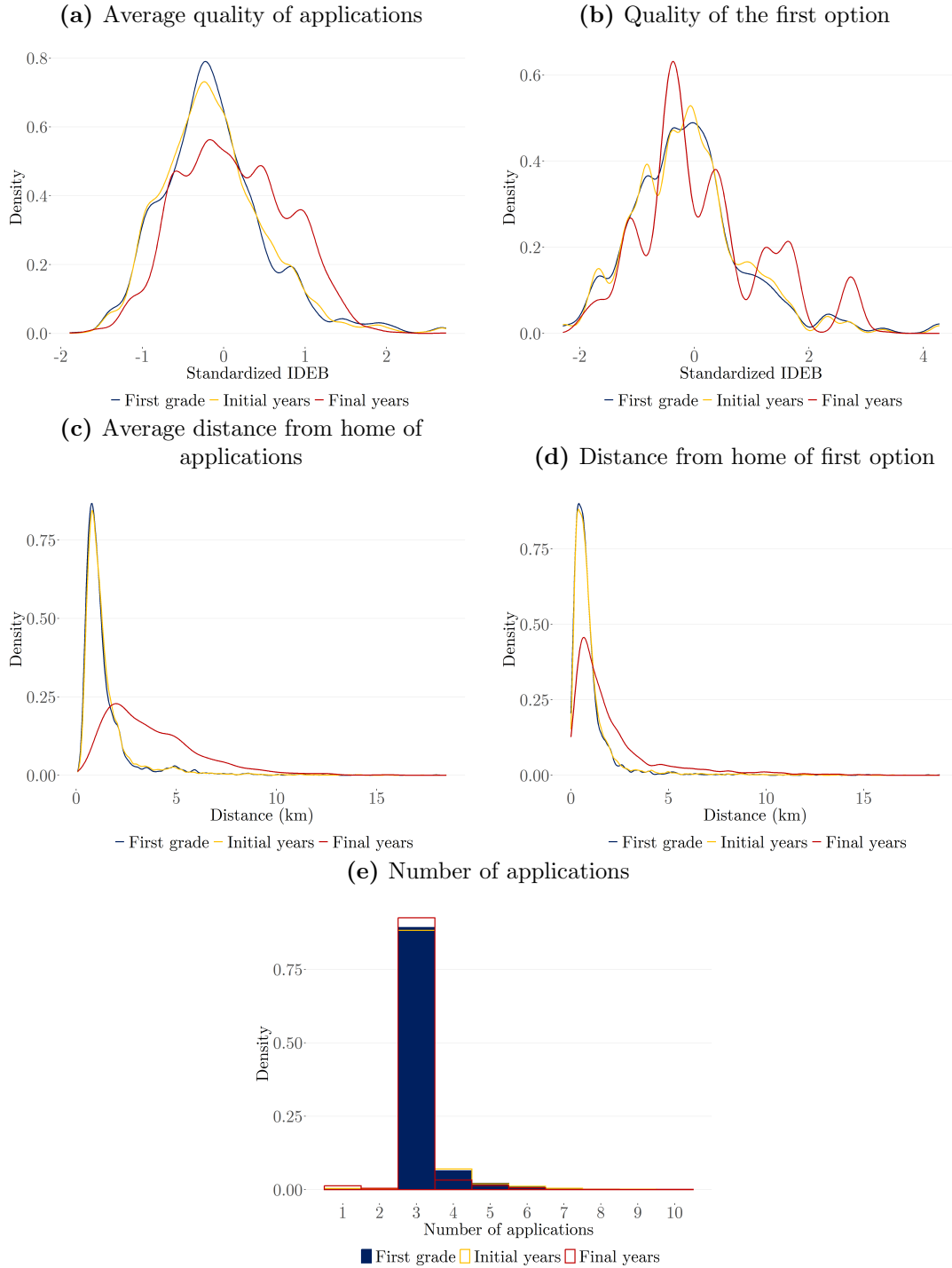
Figure 3a shows that the randomization across grades is balanced. Notably, when we investigate whether these applicants switched the predetermined order of schools while browsing the list of options, we find no discernible pattern (Figure 3b). Approximately half of the applicants rearranged the order of schools, while the other half kept the list unchanged.

Figure 3: Descriptive statistics, by treatment group



Note: Panel 3 displays the number of applicants by grade, segmented by treatment group. Panel 3b illustrates the number of applicants who changed the initial list ordering, also segmented by treatment group.

Figure 4: Distribution of outcomes, by grade



Note: This figure presents the distribution of selected outcomes by grade group (first grade, initial years, and final years). Panel 4a shows the distribution of the average quality of the first three ranked schools. Panel 4b shows the distribution of the quality of the first-ranked school. Panel 4c shows the distribution of the average distance from home of the first three ranked schools. Panel 4d shows the distribution of the distance from home of the first-ranked school. Panel 4e shows the distribution of the number of applications.

5 Empirical strategy

To measure the impact of changing the order in which school vacancies first appear on student preferences, we run regressions of the following form:

$$Y_i = \alpha + \beta T_i + \epsilon, \quad (1)$$

where Y_i represents the outcome of interest for student i . T_i is a dummy variable indicating whether student i received the treatment, where “1” refers to students in the treatment group and “0” to students in the control group. Using this specification, we aim to answer the following research questions:

1. Does the order in which schools are listed affect the quality of the highest-ranked school selected?
2. Does the listing order impact the average quality of the schools chosen?

We focus on students applying for first grade, excluding daycare and kindergarten as they are characterized by distinct admission processes (which fall outside the *Matricula Digital* framework) and because our main outcome measure—the quality index—is only applicable to primary education establishments. First grade is moreover pivotal in that it marks entry into elementary school and guarantees continuous enrollment through the ninth grade, thus laying a solid groundwork for our analysis.

Given that this is such a critical moment in the child’s educational journey, families are likely to be more receptive to recommendations for higher-quality schools. Additionally, the greater availability of slots at this entry level allows us to better assess parental preferences. In contrast, applications for higher grades are often driven by factors such as repeating a grade or relocating to a new area. Moreover, the structure of the education system, in which municipal schools cover first to fifth grades and state schools fifth to ninth grades, adds complexity. This structure provides families with alternative public school options not included in our study, which may influence how our intervention impacts outcomes.

As discussed above, a limitation of our data is that we cannot link it to administrative characteristics of the students, which prevents us from considering key attributes like socioeconomic status. To address this, we explore the effects of variables using students’ residential addresses, assessing neighborhood characteristics such as average income and school density.

6 Results

In this section, we present the empirical findings from the regression analyses above. [Table 4](#) reports the results derived from [Equation 1](#). The coefficient for the “Treatment” variable captures the average impact of presenting school vacancies ordered by quality. We observe that the initial ordering of school vacancies does not significantly impact the average quality of the selected schools (top choice or average

quality of the top three schools), the total number of schools applied to, or the probability of families rearranging the ranking order based on proximity to their home. [Table 5](#) displays the results specific to first-grade applicants. For this subgroup, the treatment similarly does not show any significant impact on the examined outcomes.

Table 4: Treatment effects, overall

	School quality		# applications	Order change
	1 st ranked	Average		
Treatment	−0.010 (0.021)	−0.013 (0.014)	0.016 (0.024)	0.004 (0.010)
R ²	0.000	0.000	0.000	0.000
Adj. R ²	−0.000	−0.000	−0.000	−0.000
Num. obs.	9459	9459	9459	9459

Note: This table presents the estimates for the treatment effect from (1), using as outcomes the quality of the first-ranked school, the average quality of the first three ranked schools, the number of schools students applied to, and the change in the initial list ordering. Standard errors are shown in parentheses. Estimates are grouped based on distance-to-school criteria. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Table 5: Treatment effects on first graders, overall

	School quality		# applications	Order change
	1 st ranked	Average		
Treatment	0.024 (0.041)	0.004 (0.026)	−0.031 (0.044)	0.030 (0.020)
R ²	0.000	0.000	0.000	0.001
Adj. R ²	−0.000	−0.000	−0.000	0.001
Num. obs.	2521	2521	2521	2521

Note: This table presents the estimates for the main coefficients of (1), using as outcomes the quality of the first-ranked school, the average quality of the first three ranked schools, the number of schools students applied to, and the change in the initial list ordering. Standard errors are shown in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

The findings align with insights from the post-application survey, where 80% of respondents identified proximity to home as their primary consideration in school selection. Consequently, ranking schools in Recife solely by quality without accounting for distance is unlikely to align with parental priorities. In fact, [Figure 4c](#) and [Figure 4d](#) show that, on average, families chose schools within a distance of less than 5km from their homes, with 89% of applications falling within this range.

To refine our analysis, as a second step we restrict the treatment group (schools ordered by quality) to include only those students residing in close proximity to at least one of the top three schools on the

list.¹⁰ The results of this analysis are displayed in Table 6 and Table 7. Although the treatment did not significantly affect school quality for the overall sample, we detect a significant positive impact on the quality of schools chosen by families applying for first grade. We also conducted the same analyses for the three other outcomes (average quality of the first three options, number of applications, and order change), but find no significant treatment effects. For brevity, we omit these tables from the main discussion.

In Table 7, we observe a significant and notable positive effect of the treatment on first-grade students, particularly when at least one of the top three schools in the quality ranking is located within a 3 km radius of the student’s home. For example, the coefficient of 0.62 in column (1) indicates that, on average, being in the treatment group results in a 0.62 unit increase in the quality score of the top-ranked school for first-grade students, compared to their counterparts not receiving the treatment. Since our analysis uses standardized quality scores, this result suggests that treated first-grade students experience an average improvement of more than half of a standard deviation in the IDEB score distribution.¹¹

As expected, the effect is inversely related to distance from the student’s home. Figure 5 shows this relationship: as distance from home increases by one km increments, the positive impact of the treatment gradually decreases, ceasing to be statistically significant beyond a 3 km threshold.

Table 6: Treatment effects on quality for the students that live nearby any of top 3 schools

	$\leq 1\text{km}$	$\leq 2\text{km}$	$\leq 3\text{km}$	$\leq 4\text{km}$	$\leq 5\text{km}$
Treatment	-0.108 (0.162)	0.027 (0.080)	0.009 (0.048)	0.027 (0.080)	-0.009 (0.030)
R ²	0.001	0.000	0.000	0.000	0.000
Adj. R ²	-0.001	-0.001	-0.000	-0.001	-0.000
Num. obs.	525	1363	2555	1363	5142

Note: This table presents the estimates for the treatment effect from (1), using the quality of the first-ranked school as outcome. Standard errors are shown in parentheses. Estimates are grouped based on distance-to-school criteria. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

¹⁰In the platform, students first select a school shift, and then the platform displays the list of school vacancies. We accordingly took this into consideration when restricting the sample. If a student chose a specific shift, we computed the distance to each of the top three schools that offered that shift. If a student chose more than one shift, we computed the distance to each of the top three schools from the pooled list of the best schools offering at least one of those shifts.

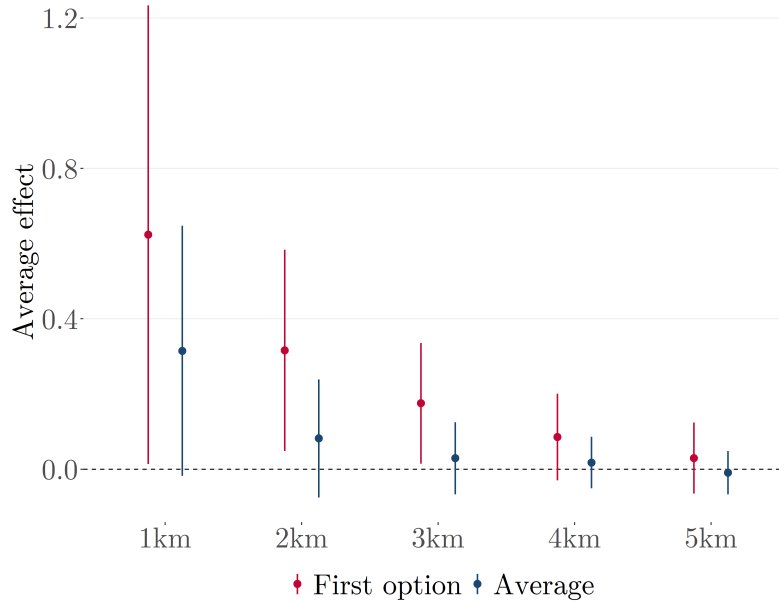
¹¹If a school has IDEB scores for both the initial and final years, we use the final years’ index as a reference. If only the initial years’ score is available, it serves as the reference. The distribution of school quality is standardized within each of these categories.

Table 7: Treatment effects on quality for first grade students that live nearby any of top 3 schools

	$\leq 1\text{km}$	$\leq 2\text{km}$	$\leq 3\text{km}$	$\leq 4\text{km}$	$\leq 5\text{km}$
Treatment	0.624* (0.368)	0.316* (0.162)	0.175* (0.097)	0.085 (0.070)	0.030 (0.058)
R ²	0.022	0.010	0.005	0.001	0.000
Adj. R ²	0.014	0.008	0.003	0.000	-0.001
Num. obs.	132	360	651	1001	1408

Note: This table presents the estimates for the main coefficients of (1) using the sample of first grade applicants and the quality of the first-ranked school as outcome. Standard errors are shown in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Figure 5: Heterogeneity for first grade students in the relevant sample, by distance group



Note: This figure presents the estimated treatment effects on the quality of the first-ranked school and average quality of the first three ranked schools, considering different samples of students based on the criteria of distance-to-school. The error bars display the 90% confidence intervals.

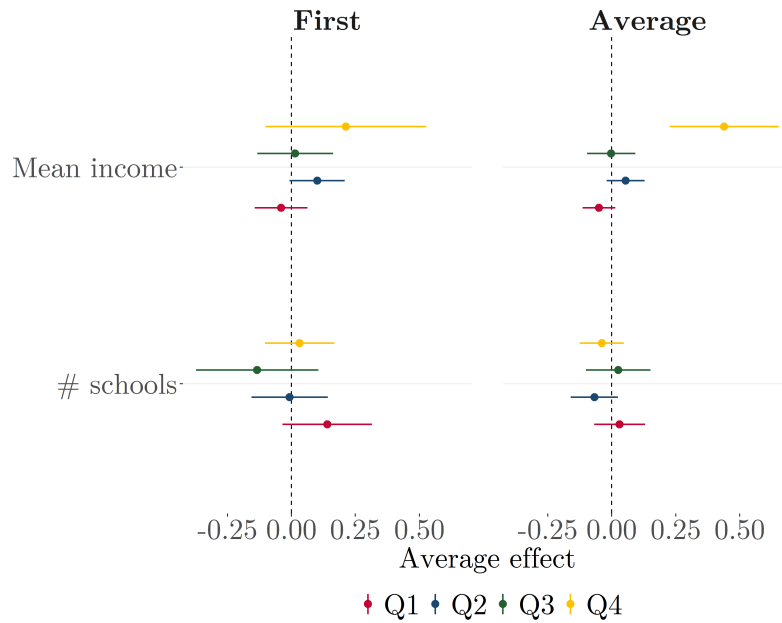
In our final analysis, we explore various heterogeneous effects for first graders. As detailed in [section 5](#), we use students' residential addresses to examine these effects more comprehensively. Specifically, we concentrate on two key characteristics within each student's census tract: average income and number of schools in the neighborhood. We analyze these characteristics by dividing their distribution into four quartiles. For this exercise, we do not impose distance constraints to maintain a sufficient number of observations within each quartile.

The results are presented in Figure 6. We observe that treated first-grade students living in the wealthiest census tracts apply to better schools in terms of quality. The effect is not statistically significant for other income levels, although the point estimates appear to increase with income.

This outcome suggests that higher-income families in Recife may be more familiar with school quality indicators, such as the IDEB, or that wealthier families place greater emphasis on the importance of educational quality in their decision-making process. In fact, studies consistently show that disadvantaged families place more weight on proximity than school quality (Hastings and Shapiro, 2009, among others). Unfortunately, we lack any information on family socioeconomic characteristics that would allow to test these hypotheses.

We do not find significant heterogeneity in terms of census tract characteristics for the number of applications or change of the initial ordering and therefore omit these results for brevity.

Figure 6: Heterogeneity for quality, census tracts characteristics



Note: This figure illustrates the estimated treatment effects on quality for first-grade students, based on census tract characteristics. Q1 represents the first quartile of the distribution, Q2 the second quartile, Q3 the third quartile, and Q4 the fourth quartile. The error bars display the 90% confidence intervals.

7 Conclusion

This paper examines the effect of a digital nudge within Recife’s centralized school admission system. The nudge was designed to guide families toward choosing higher-quality schools by rearranging the order of the schools they first saw in the online system. While our results indicate that this change in presentation order did not have a widespread effect on the overall quality of schools selected, it did have a significant positive impact on families living close to top-ranked schools, particularly for first-grade enrollments. The effectiveness of this strategy diminishes as distance between the student’s home and the school increases, indicating the importance of both school quality and proximity in parental choice.

Our findings highlight the potential of low-cost digital nudges in centralized admission systems to benefit families facing information barriers. However, they also show that these are effective only when there is a sufficient supply of high-quality schools within reasonable proximity. The study therefore underscores the importance of considering the roles of both school quality and proximity in family preferences. It also points to a need for strategic planning of school locations and the distribution of available slots to ensure an adequate supply of geographically accessible high-quality schools. In addition, we observe that families in wealthier areas are more likely to select higher-quality schools, confirming that providing information alone is insufficient to shift parental preferences.

These results have broader implications for addressing spatial inequalities and improving access to better schools. Strategies such as enhancing transportation options, launching targeted information campaigns, and providing more detailed school information to parents could help mitigate disparities. The parental survey, as a complement to the study, provides valuable insights—such as the strong preference for school proximity—as well as indicates potential limitations and future research opportunities, including the demand for more detailed information about schools. Further work could provide critical insights for policy-making aimed at enhancing transparency, equity, and efficiency in centralized school allocation systems.

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Appendix

A0.1 Information Campaign

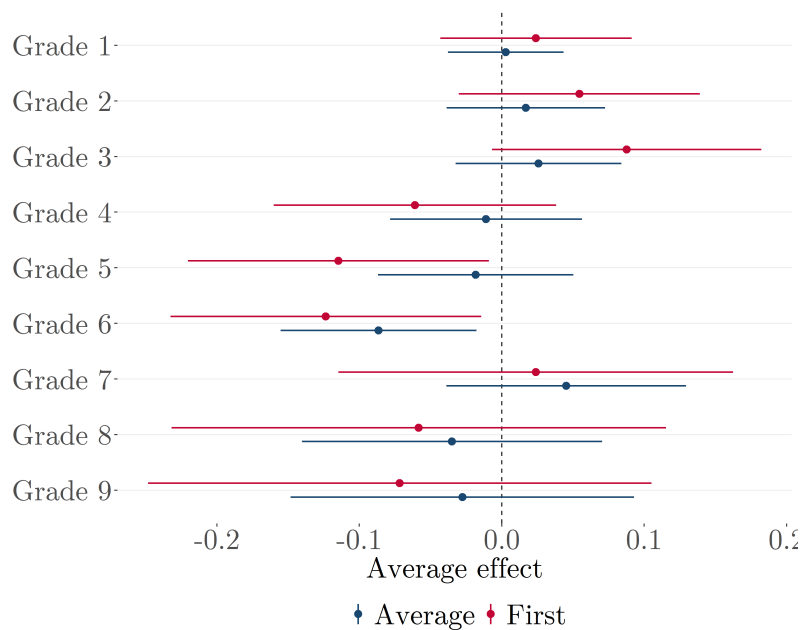
Figure A1: CPF (Unique Student Identification) Campaign



Source: Secretary of Education.

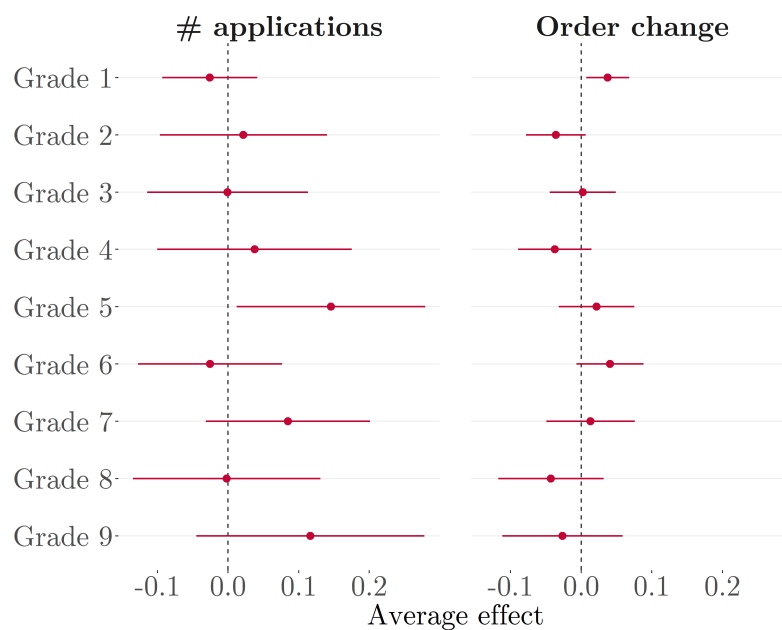
A0.2 Heterogeneity by grade, baseline sample

Figure A2: Heterogeneity for quality, baseline sample



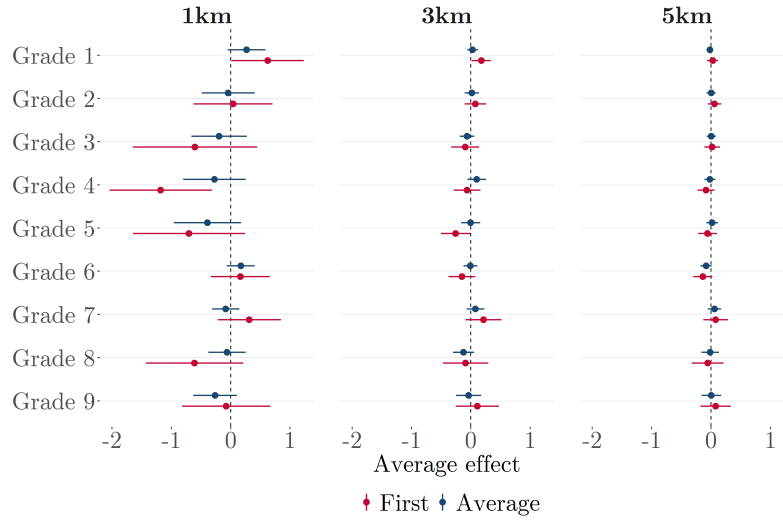
Note: This figure illustrates the estimated treatment effects on the quality of the first-ranked school and the average of the first three ranked schools for applicants from different grades. The error bars display the 90% confidence intervals.

Figure A3: Heterogeneity for other outcomes, baseline sample



Note: This figure illustrates the estimated treatment effects on the number of applications and change of the initial list ordering for applicants from different grades. The error bars display the 90% confidence intervals.

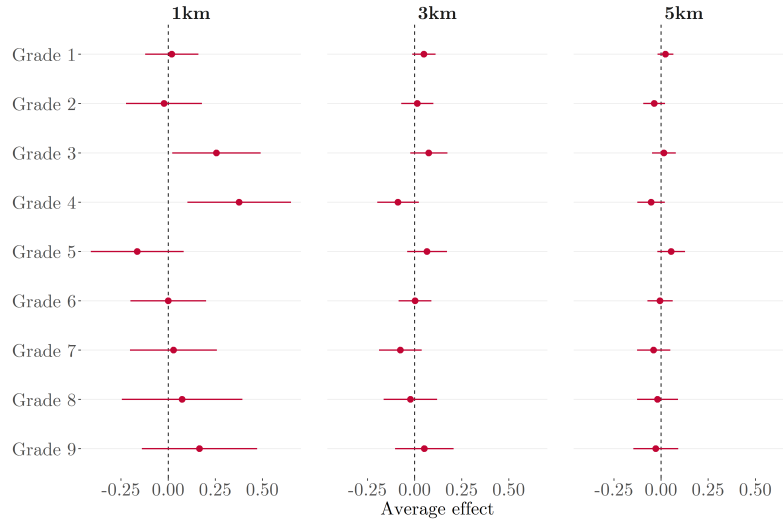
Figure A4: Heterogeneity for quality, applicants that live nearby any of the top 3 schools



Note: This figure illustrates the estimated treatment effects on the quality of the first-ranked school and the average of the first three ranked schools for applicants from different grades, based on various levels of the distance-to-home criteria. The error bars display the 90% confidence intervals.

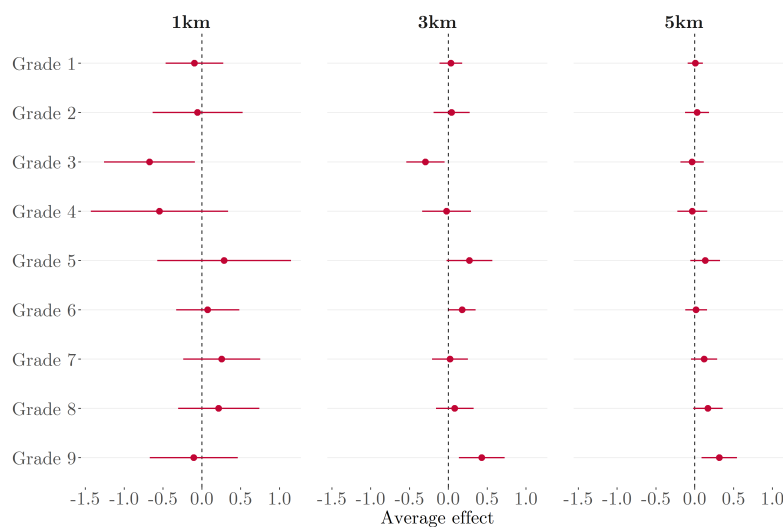
A0.3 Heterogeneity by grade, relevant sample

Figure A5: Heterogeneity for order change, applicants that live nearby any of the top 3 schools



Note: This figure illustrates the estimated treatment effects on the change of the initial list ordering for applicants from different grades, based on various levels of the distance-to-home criteria. The error bars display the 90% confidence intervals.

Figure A6: Heterogeneity for number applications, applicants that live nearby any of the top 3 schools

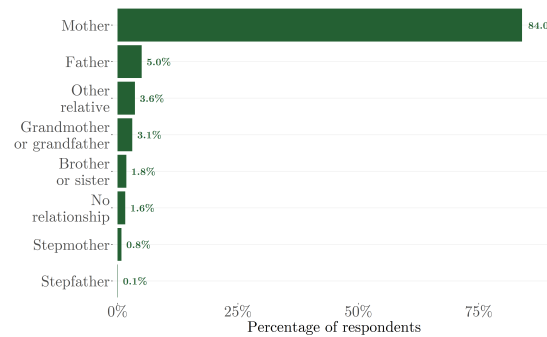


Note: This figure illustrates the estimated treatment effects on the number of applications for applicants from different grades, based on various levels of the distance-to-home criteria. The error bars display the 90% confidence intervals.

A0.4 Survey results

- 2248 individuals answered the survey.
- Most of the respondents (74.7%) requested a vacancy in non-preferable schools just to fulfill the minimum schools required by the system.
- Most of the respondents of the survey were students' mothers

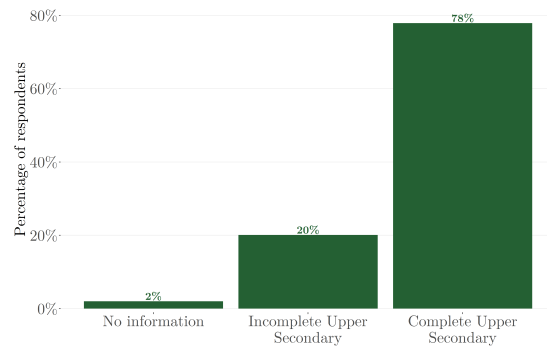
Figure A7: Relationship with the student



Note: This figure illustrates the proportion of respondents segmented by their relationship or connection with the students. Respondents indicated the characteristics when answering the following question: “What is your relationship or connection to the student?”.

- Most of students mothers or stepmothers have completed the Upper Secondary Education.

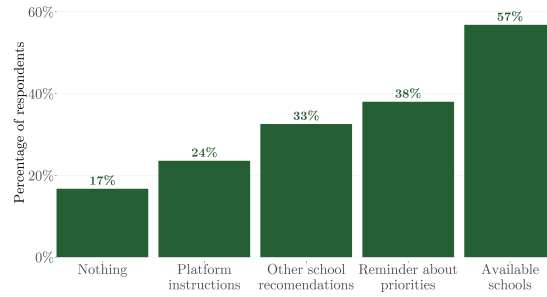
Figure A8: Mother or stepmother educational level



Note: This figure illustrates the proportion of respondents segmented by the students' mother or stepmother educational level. Respondents indicated the characteristics when answering the following question: “What is the highest level of education that the student's mother (or stepmother) has achieved? (if the student has both, consider the one who lives in the same household as the student)”.

- Most of the respondents would like to have more information on the platform.

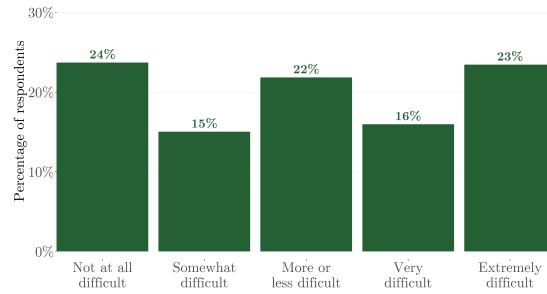
Figure A9: Respondents demand for additional information on the platform



Note: This figure presents the proportion of respondents who desired more information on the platform. respondents indicated the dimensions when responding to the following question: “What additional information would you have liked to receive on the platform?”.

- Many respondents found it difficult to select schools on the platform.

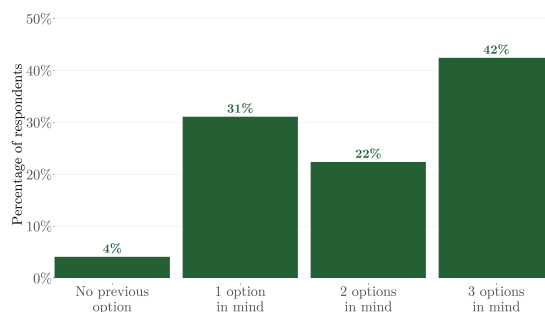
Figure A10: Difficulty level of the system according to respondents



Note: This figure displays the proportion of respondents segmented by their perception of the difficulty level of the platform’s usability. Respondents answered the following question: “How difficult was it to select schools on the platform?”.

- Most of the respondents (67.7%) have accessed the system more than 3 times. Many of them (39.6%) have accessed it 5 times or more.
- Many respondents already had at least an idea about which school they would you like to apply for.

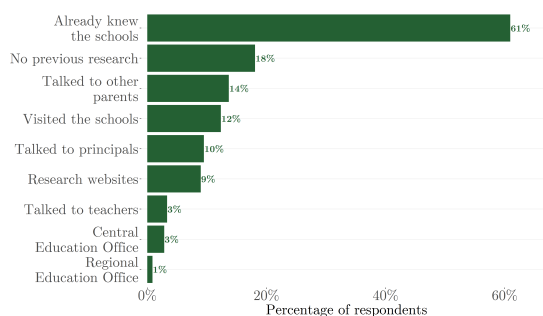
Figure A11: Percentage of respondents that had at least an idea about which school they would like to apply to



Note: This figure illustrates the proportion of respondents based on their previous knowledge regarding the schools they wanted to apply to. Respondents responded to the following question: “Before accessing the platform, did you have at least an idea about which school you would like to apply to?”.

- Most of the respondents already had information about the schools they would apply to

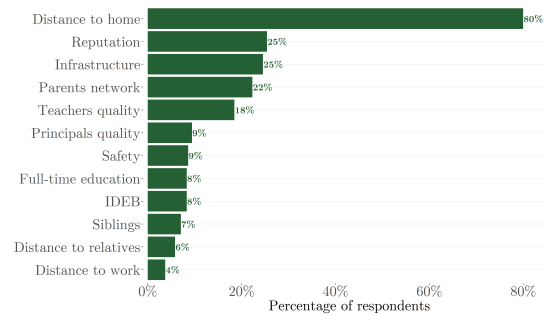
Figure A12: Respondents source of information about schools



Note: This figure illustrates the proportion of Respondents segmented by their sources of information about school. Respondents indicated the sources of information when responding to the following question: “Did you research information about the schools before accessing the system?”.

- The most important characteristic of schools determining respondents choice was distance to their homes

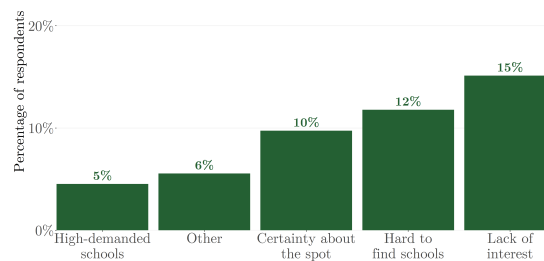
Figure A13: Most important school characteristics for respondents choice



Note: This figure illustrates the proportion of respondents segmented by the school characteristics they find more important. Respondents indicated the characteristics when answering the following question: “During the vacancy request, which types of schools were your favorites?”.

- Many respondents (46.4%) would like to have requested vacancies in more schools.

Figure A14: Reasons for not requesting additional vacancies



Note: This figure illustrates the proportion of respondents segmented by the reasons they provided for not requesting additional vacancies in the platform. For respondents who answered “Yes” to the question ‘Would you have preferred to request a vacancy in more than one school?’, they were asked to indicate their reasons.