

# Social Interactions and Preferences for Schools: Experimental Evidence from Los Angeles \*

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## Abstract

This paper studies how parents' preferences for schools are affected by information about school and peer quality and how social interactions mediate changes in demand. I design an information intervention that cross-randomizes whether parents receive information about school quality (school value-added) and peer quality. Using a spillover design that varies the saturation of information across schools, I also randomize parents' proximity to other parents with similar information. I find that the information leads to changes in parental preferences toward higher value-added schools, and this occurs when both parents and their neighbors receive information. These results imply substantial information spillovers. I complement this evidence with survey data on the distribution of beliefs over school and peer quality and conclude that the direct and spillover effects of my experiment come primarily from changes in parental preferences rather than an updating of parental beliefs in response to information. These findings show that when parents are informed about school and peer quality, their social interactions lead to changes in preferences in a way that rewards more effective schools. Last, enrollment in more effective schools led to improved socio-emotional outcomes not captured by standardized exams.

Keywords: school choice, school quality, preferences, information

JEL Classification: I21, I24

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\*I am thankful to Chris Walters and Jesse Rothstein for their extensive support and guidance. I thank Marianne Bertrand, Mike Dinerstein, Anders Humlum, Jacob Leshno, Paco Martorell, Todd Messer, Pablo Muñoz, Derek Neal, Chris Neilson, Matt Notowidigdo, Canice Prendergast, and Seth Zimmerman for helpful comments. I also thank seminar participants at the University of Chile, Harvard Kennedy School, Michigan State University, RAND, UC Berkeley, UC Davis, UC Merced, University of Illinois-Chicago, Yale University, and conference participants at the 2022 Southern Economic Association Annual Meeting, the 2023 AEA Annual Meeting, and the Transitions to Secondary and Higher Education Workshop. Anh Tran and Jack Johnson provided outstanding research assistance. This work would not be possible without the support of Dunia Fernandez, Kathy Hayes, and Rakesh Kumar. All remaining errors are my own. The trial was registered in the AEA RCT Registry as study #AEARCTR-0004844 and received IRB approval from the University of California Berkeley and the University of Chicago.

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# 1 Introduction

Parents' valuation of effective schools govern the success of school choice policies, but many open questions remain as to what they prioritize. Some studies suggest that parents prioritize schools that improve student learning (Beuermann et al., 2022, Campos and Kearns, 2023), while others find that they tend to prioritize schools based on peer attributes regardless of the quality of the school itself (Abdulkadiroğlu et al., 2020, Ainsworth et al., 2023, Rothstein, 2006). Much of the existing evidence, however, tends to rely on revealed preference arguments that are complicated by the presence of imperfect information. As a consequence, the existing evidence encounters challenges isolating preferences in settings where choices are made with imperfect information. In addition to uncertainty about parents' valuations, open questions remain about what parents know when making decisions and what factors mediate their choices.

This paper reports evidence from an experiment that sheds light on these open questions. To understand the severity of information frictions, I elicit parents' beliefs about school and peer quality in a baseline survey. Both measures have been extensively studied in prior work (Abdulkadiroğlu et al., 2020, Ainsworth et al., 2023, Beuermann et al., 2022, Hastings and Weinstein, 2008, Rothstein, 2006), but to date, we have a limited understanding of what parents actually know. For the purposes of the intervention and belief elicitation, school quality is referred to as achievement growth (AG) and peer quality is referred to as incoming achievement (IA). Belief elicitation is followed by information provision that distributes information on both quality measures and allows me to study how choices evolve in a laboratory-like setting. Combining information about beliefs with the information provision allows for a novel decomposition of treatment effects into factors driven by salience and information updating, a feature missing from most information interventions (Haaland et al., 2020). Last, to gain insight into factors mediating choices, I introduce a component into the design that allows me to measure the importance of social interactions (Golub and Sadler, 2017).

The setting is a market of high schools in Los Angeles neighborhoods referred to as Zones of Choice (ZOC) neighborhoods (Campos and Kearns, 2023).<sup>1</sup> In eighth grade, students living in ZOC neighborhoods apply to their neighborhood-based market with several nearby schools. Each market is unique in its offerings, size, and location, which provides a rich setting to experimentally study behavior in many markets with pre-determined, market-specific enrollment flows. Applications and assignments are centralized, allowing insight into rich demand-side behavior to probe and understand how information interventions affect the ways families systematically trade off different school attributes. The setting provides roughly 20,000 eighth-grade students enrolled at 104 middle schools across two experimental waves.

The design of the experiment is inspired by prior work (Ainsworth et al., 2023, Cohodes et al., 2022, Corcoran et al., 2018, Hastings and Weinstein, 2008) but is differentiated in important ways. As in previous work, I randomize schools into different treatment groups. The first differentiation point of my experiment is the school-level randomization that varies the share of families assigned treatments within each school; I refer to the share as the saturation level. The second differentiation from prior work is that two information treatments are cross-randomized

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<sup>1</sup>The ZOC program is a form of controlled choice, similar to past controlled choice programs, but with different goals motivating the controlled choice scheme.

within schools, conditional on the saturation level. This mirrors the canonical spillover design employed in prior work (Crépon et al., 2013). In the ZOC setting, this design choice allows one to isolate how choices change in response to various information treatments and to isolate the role of social interactions identified by spillover effects.

I begin with a reduced-form analysis focusing on difference-in-difference estimates of the intervention's effects. This provides several advantages, including a boost in precision and natural falsification tests of effects in pre-intervention periods. I find increases in demand for schools with higher AG among those receiving any treatment. I find sizable spillover effects, statistically and nominally equivalent to treatment effects, the first piece of evidence that social interactions matter. The treatment effects are nuanced, however, in that any effects, direct or spillover, are only detected in high saturation schools. These findings suggest that social interactions are key to generating any meaningful changes in demand, so important that if not enough parents are nearby to discuss the information, then treated parents also do not act on the information. Nonetheless, the impacts on most-preferred school AG suggest there is scope to increase the competitive pressure schools face in public education markets and where competition may be lacking due to apparent preferences for peer quality (Abdulkadiroğlu et al., 2020, Ainsworth et al., 2023).

The reduced form evidence is informative but does not provide insights into the underlying mechanisms at play. On the one hand, the information campaign operates by allowing parents to update their information sets and make more informed decisions, a channel I refer to as information updating. Alternatively, the information campaign can make parents change the importance they assign the various quality measures, a channel I refer to as salience (Bordalo et al., 2013, 2022). Both of these channels are likely relevant across the multiple information interventions across the literature, but without additional data, it is hard to distinguish between these channels.

Based on these insights, I complement the information intervention with survey data I collect about parents' beliefs about both measures of quality.<sup>2</sup> Combining novel survey data with information provision and a discrete school choice model allows for a novel decomposition of treatment effects that nest the combination of salience and information updating effects. The decomposition relies on the first and second moments of the beliefs distribution, which I collect in the survey. Therefore, the baseline survey is intrinsically linked to the moderately structural experimental analysis that complements the reduced form evidence.

Four facts arise from the survey data. First, families tend to underestimate their school's AG and overestimate IA; I refer to overestimation as optimism and underestimation as pes-

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<sup>2</sup>The beliefs data shed light on the joint distribution of families' beliefs, but eliciting beliefs about two different measures of quality presents some challenges in conveying messaging to parents that are addressed in various ways. I address this challenge in two ways. First, through extensive piloting, the choice of messaging succinctly signals the difference between peer quality and school quality. Peer quality is referred to as incoming achievement (IA) to emphasize the invariance to school quality, and school quality is referred to as achievement growth (AG) to emphasize a change in achievement partly attributable to the school. Second, throughout the intervention, I deploy videos to teach and aid families' understanding of the differences between IA and AG. The videos serve an instrumental role in improving families' understanding of the content, working in tandem with the social interactions the experiment is designed to measure. Additional details about these factors are provided in Section 4.

simism.<sup>3</sup> These differences hold across the rank-ordered list, with modest gradients indicating that families are more pessimistic about the schooling options that they prefer less. Second, I find modest bias gradients with respect to student baseline achievement. Families' mean AG pessimism holds across the baseline achievement distribution at roughly half of a decile. In contrast, their IA optimism is less pronounced and approaches researcher-generated values among families with higher-achieving students. Third, I do not find salient student-level attributes that correlate with either IA or AG biases. This finding mirrors evidence that value-added measures tend to weakly correlate with observables, with a key distinction being that I focus on beliefs about value-added. Fourth, conclusions about preferences are highly sensitive to using researcher-generated measures or elicited measures. Using elicited measures instead of researcher-generated ones implies vastly different preference estimates and serves as caution when interpreting estimates in a variety of studies (Abdulkadiroğlu et al., 2020, Ainsworth et al., 2023, Beuermann et al., 2022, Campos and Kearns, 2023).

With the survey data, I turn to estimate treatment effects on utility weights assigned to school and peer quality in a discrete choice model. This analysis features a few key advantages. First, it uses information from the entire rank-ordered list, providing a comprehensive summary of how families trade off school and peer quality. Second, the reduced-form analysis studies effects on demand for IA and AG in isolation, while this analysis can hold constant preference impacts for one quality measure while studying preference impacts for the other. Third, with information about the first and second moments of the belief distribution, I can decompose utility weight impacts into various sources. Therefore, treatment effects on utility weights overcome the reduced-form limitations and provide another corroborating perspective about how the intervention affects school choices.

I find that families increase their willingness to travel for AG; similarly, I find that their willingness to travel for IA decreases. The increases in willingness to travel for AG range between 0 and 0.7 kilometers for a school that has AG scores that are 10 percentile points higher. The decreases in willingness to travel for IA range between 0.4 and 1.4 kilometers. The findings are mostly consistent with the reduced-form results, with magnitudes that are quantifiable in terms of willingness to travel. Spillover effects remain mostly identical to the treatment effects within saturation clusters, a third and final piece of evidence highlighting the importance of social interactions. Last, decompositions demonstrate that most of the changes are due to changes in preferences, also interpreted as salience effects. Taken at face value, this finding suggests that while families do update their information in response to the intervention, the observed changes in choices mostly reflect a reorientation of their preferences toward higher value-added schools, in part a consequence of bottom-up attention discussed by Bordalo et al. (2013) and Bordalo et al. (2022). Overall, the experiment provides robust evidence that when properly informed, families make choices in a way that is consistent with them rewarding effective schools and that social interactions are important mediators governing changes in demand.

The findings in this paper contribute to three strands of literature, with the most immediate related to parents' valuation of effective schools. Early findings focus on implications from school choice experiments where some students are lotteried into their most-preferred schools, while

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<sup>3</sup>Only beliefs about schools in families' choice set were elicited.

others fail to receive offers (Abdulkadiroğlu et al., 2014, Cullen et al., 2006, Deming et al., 2014, Lucas and Mbiti, 2014). The findings in these papers more or less conclude that there are minimal impacts from enrolling in a most-preferred school, indicating that parents do not systematically sort into schools with higher value-added or school quality differences within local markets are minimal. More recently, a growing body of evidence has turned to estimating preferences leveraging the full suite of information contained in rank-ordered lists submitted to centralized assignment systems. Some find that parents value effective schools (Beuermann et al., 2022, Campos and Kearns, 2023), and others find that families are unresponsive to quality variation conditional on peer quality (Abdulkadiroğlu et al., 2020, Ainsworth et al., 2023).

While these recent papers are a step forward in understanding parents' preferences, they all invariably rely on revealed preference arguments in settings where it is plausible that imperfect information looms large. The presence of imperfect information muddles the interpretation as estimates could reflect families misoptimizing as opposed to expressing genuine preferences. This paper contributes to the literature in two ways. It is the first to show evidence of the joint distribution of families' beliefs on peer and school quality. Existing papers have alluded to the potential presence and importance of biases, while this paper measures them. The paper also provides experimental evidence of how families' choices systematically change under various information scenarios, alleviating concerns about interpreting estimates due to information frictions.

An extensive literature has deployed information interventions to answer and address a variety of policy-relevant questions (Haaland et al., 2020). In education, the seminal work of Hastings and Weinstein (2008) highlights the importance of information frictions in school choice settings and the potential for information to change both choices and outcomes. Follow-up work has emphasized the importance of easily accessible information and potential inequities in who takes up the information (Cohodes et al., 2022, Corcoran et al., 2018), while also emphasizing the importance of participants lack of awareness with underlying mechanism rules (Arteaga et al., 2022). More recently, a turn to the potential equilibrium effects of large-scale policies has further motivated the usefulness of these interventions in affecting outcomes (Allende et al., 2019, Andrabi et al., 2017).

The existing papers, however, tend to focus on measures that are similar to what I refer to as peer quality and do not distinguish between preferences for peer or school quality. Ainsworth et al. (2023) is the only paper to consider a school-quality-based intervention but omits to differentiate between school and peer quality effects in their analysis. This paper builds on the existing work that uses information interventions to address school choice inequities, and it contributes by shedding light on families' preferences and decomposing treatment effects to estimate policy-relevant effects.

A third and nascent literature has focused on the implications of peer effects in the school choice process. Existing papers have primarily focused on how externalities permeate through demand systems, with Allende et al. (2019) studying how preferences for peers distort school incentives in a structural model based on insights from Rothstein (2006). Another strand of papers in the market design literature have highlighted that stable matchings may not exist if preferences are interdependent (Sasaki and Toda, 1996). A recent strand of papers have tackled

studying the existence of stable matchings, allowing market participants to express preferences for peer attributes (Cox et al., 2021, Leshno, 2021). This paper provides empirical evidence that such peer preferences may not matter in some markets and is consistent with findings for prior ZOC cohorts (Campos and Kearns, 2023). My findings also pivot the peer effect discussion from externalities that do not generate interdependent preferences as captured by preferences for peer composition to externalities operating through information and social networks (Golub and Sadler, 2017). The evidence of social interactions in the school choice process gives rise to potential network-based inequalities that have received less empirical attention, opening up an avenue for future work.

The rest of the paper is organized as follows. Section 2 provides a description of the setting in which the intervention takes place. Section 3 presents a simple school choice framework that aids the interpretation of effects and motivates the final decomposition. Section 4 discusses the experiment’s design in detail as well as the data and standard checks in the randomized control trials. Section 5 reports results from a reduced-form analysis of the intervention’s impacts. Section 6 reports descriptive evidence arising from the survey and studies the intervention’s effects from a discrete choice perspective providing insights into the various channels contributing to the intervention’s impact. Section 8 discusses the implications of the findings for future research, and Section 9 concludes.

## 2 Institutional Details

The ZOC program is one of several public choice alternatives provided by the Los Angeles Unified School District (LAUSD) in addition to charter schools, magnet programs, and other choice options. It is a neighborhood-based school choice program that organizes clusters of schools and programs into local markets and offers families several nearby options as opposed to a single neighborhood program. ZOC markets operate independently, with their student population determined by geographic boundaries drawn by the district.<sup>4</sup> The markets vary in size and programs’ spatial differentiation. Some markets contain as few as two schools (2 programs) to as many as five schools (15 programs), and families apply to programs in their market the year before enrollment. Campos and Kearns (2023) provide a more detailed description of the program’s history and expansion in 2012.

ZOC does not cover the entire school district. Most of the zones are concentrated in Central, South, and East Los Angeles, with some zones as far south as Narbonne and others as far north as Sylmar in the San Fernando Valley. Although LAUSD is composed of primarily Hispanic students (68%), the Hispanic share within ZOC neighborhoods is 86%. Nearly all (90%) of ZOC students are classified as poor, and their parents are less likely to have college degrees. The relative homogeneity of students within ZOC markets is an important and distinguishing feature of this program compared to other controlled choice programs (Orfield and Frankenberg, 2013).

Families residing within ZOC boundaries apply to high schools during the fall semester of

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<sup>4</sup>Not all families residing within a Zone of Choice enroll in a program school. Some opt for a charter sector, some opt for a private schools, and some enroll in another district magnet program through another centralized choice system.

their students' eighth-grade year. During this time, ZOC administrators and guidance counselors make the application a salient aspect of this semester. It is during this time period where most families learn about the program's existence and start researching their options.<sup>5</sup> Failure to submit an application may result in being assigned to an undesirable school that is not a students' neighborhood school. In addition to application submission incentives, district and high school administrators devote a considerable amount of time and resources to inform parents about the program and their options. District administrators meet with middle schools to help facilitate application submissions, and they also hold information sessions to inform parents about the program, their options, and how to submit applications. Open houses are hosted by high schools to help recruit students. In past years, the district experimented with sending mailers to families informing them about the program and their options.

School assignments are made centrally by the ZOC office through the use of an immediate acceptance mechanism, also referred to as the Boston mechanism (Abdulkadiroğlu and Sönmez, 2003) or the first preference first mechanism (Terrier et al., 2021). There are neighborhood and sibling priorities that are taken into consideration during the assignment process, but no other priorities or screening strategies are in place as is common in New York City (Cohodes et al., 2022, Corcoran et al., 2018). Although the length of the list is not capped, avoiding theoretical and empirical issues highlighted in the literature (Calsamiglia et al., 2010, Haeringer and Klijn, 2009), the mechanism is not strategy proof as it incentivizes families to misreport their ordinal preferences to avoid being assigned to a school far down their preference list (Abdulkadiroğlu and Sönmez, 2003).

In general, there is mixed evidence about the degree of sophistication and incentives to misreport preferences under immediate acceptance mechanisms. One body of evidence from various cities shows that low socioeconomic status families are more prone to misunderstand the rules and are less likely to strategize (Abdulkadiroğlu et al., 2006, Agarwal and Somaini, 2018, Terrier et al., 2021), while other research finds weaker socioeconomic status gradients with respect to strategizing (Calsamiglia et al., 2020). ZOC anecdotes suggest that the mechanism's rules are not too salient during information sessions. Therefore, it is likely that strategizing is not a first-order concern given the disproportionate share of low socioeconomic status families and the low importance assigned to the mechanisms' technical rules beyond priorities.

Information gaps are likely prevalent in ZOC markets. To begin, many families are unaware of their eligibility and necessity to participate in the program at the start of the application cycle (see Appendix C). In addition, many "low-touch" information interventions have been shown to influence K-12 choices across the United States (Cohodes et al., 2022, Corcoran et al., 2018, Hastings and Weinstein, 2008, Valant, 2014, Weixler et al., 2020) and around the world (Ajayi and Sidibe, 2020, Ajayi et al., 2020, Allende et al., 2019, Andrabi et al., 2017, Arteaga et al., 2022). The findings from low-touch interventions argue that treatment effects imply the presence of imperfect information as perfectly informed families would not change their choices in response to researcher-provided information.

These implications are limited as a combination of factors influence changes in K-12 choices

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<sup>5</sup>The survey results discussed in Section 6 show that roughly 70% of families in the 2021 application cohort had not heard of the program at the start of the application cycle.

in response to information interventions. For example, simply showing families information about any attribute will make them rethink the importance of that attribute, effectively “changing” their preferences, referred to as bottom-up attention by Bordalo et al. (2022). Without additional data on families’ beliefs, however, it is impossible to distinguish between information-updating and salience (or preference) effects. Perhaps surprisingly, the existing literature is thin in terms of collecting families’ beliefs (Ainsworth et al. (2023) is a notable exception) and thus cannot distinguish between the confluence of factors contributing to changes in K-12 choices. The following section bridges this gap with a simple model that motivates the survey collection and intervention.

### 3 Conceptual Framework

Canonical school choice models assume families have accurate information at the time they make decisions, yet a growing body of evidence suggests this assumption is far from true (Ainsworth et al., 2023, Andrabi et al., 2017, Arteaga et al., 2022, Hastings and Weinstein, 2008). Imperfect information will distort choices and introduce allocative inefficiencies and affect outcomes (Abaluck and Compiani, 2020, Ainsworth et al., 2023). In this section, I outline a school choice model that models the effects of information treatments in a setting with and without information frictions. The comparison of the settings allows for a natural decomposition of treatment effects that inform about the role of salience and information updating in contributing to the effects induced by information campaigns.

Families are indexed by  $i \in \mathcal{I}$  and schooling options by  $j \in \mathcal{J}$ . In a model without information frictions, indirect utility of family  $i$  enrolling their child in school  $j$  is

$$U_{ij} = \delta_j - \lambda d_{ij} + \varepsilon_{ij},$$

where  $\delta_j$  captures mean utility of school  $j$ ,  $d_{ij}$  measures the distance between household  $i$  and school  $j$ , and  $\varepsilon_{ij}$  is unobserved preference heterogeneity. I assume that mean utility is summarized by school and peer quality,  $Q_j^S$  and  $Q_j^P$ , respectively:

$$\delta_j = \gamma_P Q_j^P + \gamma_S Q_j^S.$$

The school district distributes information to a subset of families, randomizing the families who receive information and the information they receive (see Section 4 for intervention details). Let  $\mathcal{I}_P$  and  $\mathcal{I}_S$  be the set of families receiving peer quality and school quality information, respectively, and let  $\mathcal{I}_B$  correspond to the families receiving information about both. The effects of the information campaign can be summarized by changes in the weights families assign to peer and school quality. In particular,

$$U_{ij} = \gamma_P Q_j^P + \gamma_S Q_j^S + \sum_{t \in \{P, S, B\}} (\beta_{Pt} Q_j^P + \beta_{St} Q_j^S) \times \mathbf{1}\{i \in \mathcal{I}_t\} - \lambda d_{ij} + \varepsilon_{ij}$$

where  $\beta_{St}$ ,  $\beta_{Pt}$ , and  $\beta_{Bt}$  summarize the change in weights treated families assign to the various quality measures. In a model without information frictions, any changes in the weights families

place are due to salience. This is analogous to the salience impacts driven by bottom-up attention discussed by Bordalo et al. (2013) and Bordalo et al. (2022). In this framework, any changes in preferences must be due to families making it more prominent in their decision-making after being reminded of the information and not due to information gaps.<sup>6</sup>

In a model with information frictions, families make decisions using their beliefs about  $Q_j^P$  and  $Q_j^S$ . One way to model beliefs is to allow families to have idiosyncratic quality-specific biases,  $\tilde{Q}_{ji}^P = (1 + b_{Pi})Q_j^P$  and  $\tilde{Q}_{ji}^S = (1 + b_{Si})Q_j^S$ . I assume that beliefs are jointly normal,

$$\begin{pmatrix} b_{Pi} \\ b_{Si} \end{pmatrix} \sim \mathcal{N}\left(\begin{pmatrix} \mu_P \\ \mu_S \end{pmatrix}, \begin{pmatrix} \sigma_{Pb}^2 & \rho_b \sigma_{Pb} \sigma_{Sb} \\ \rho_b \sigma_{Pb} \sigma_{Sb} & \sigma_{Sb}^2 \end{pmatrix}\right),$$

with  $\rho_b$  governing the correlation of biases and  $\sigma_{Pb}$  and  $\sigma_{Sb}$  the respective standard deviations.

In the absence of the information campaign, indirect utility is

$$\tilde{U}_{ij} = \tilde{\gamma}_{Pi} Q_j^P + \tilde{\gamma}_{Si} Q_j^S - \lambda d_{ij} + \tilde{\varepsilon}_{ij} \quad (1)$$

where  $\tilde{\gamma}_{Pi} = \gamma_P(1 + b_{Pi})$  and  $\tilde{\gamma}_{Si} = \gamma_S(1 + b_{Si})$ . The beliefs distort the effective weights families assign the various attributes. As in the case with perfect information, the information campaign induces salience effects but also affects belief biases,  $b_{Pi}$  and  $b_{Si}$ . These effects are summarized by changes in the implicit weights families assign to  $Q_j^P$  and  $Q_j^S$

$$\tilde{U}_{ij} = \tilde{\gamma}_{Pi} Q_j^P + \tilde{\gamma}_{Si} Q_j^S + \sum_{t \in \{P, S, B\}} (\tilde{\beta}_{Pt} Q_j^P + \tilde{\beta}_{St} Q_j^S) \times \mathbf{1}\{i \in \mathcal{I}_t\} - \lambda d_{ij} + \tilde{\varepsilon}_{ij}. \quad (2)$$

In contrast to the model without information frictions, the changes in utility weights nest various factors. Because the utility weight changes are identified by comparing the choices of applicants across treatment groups that are making choices with and without information, we can decompose the impact. For example, the average change in willingness to travel for peer quality induced by information only about peer quality is

$$\begin{aligned} E[\Delta WTT_{iP}] &\equiv E[WTT_{iPP} - WTT_{iP0}] \\ &= \frac{\beta_{PP} - \gamma_P \mu_P}{\lambda} \end{aligned} \quad (3)$$

where  $WTT_{iPP}$  is the willingness to travel for peer quality among those receiving the peer quality-only treatment and  $WTT_{iP0}$  is the analogous measure for parents not receiving any information. The changes induced by the information consist of two factors,  $\beta_{PP}$  corresponds to the salience impact and  $\gamma_P \mu_P$  capturing a component due to information updating. The latter term pins down the portion of the change attributable to the degree of baseline bias in the population. In the perfect information setting, we have  $\gamma_P = 0$  and the changes in willingness to travel are only due to salience. In general, a portion of the average change in willingness to travel will consist of both salience and information updating effects. With a randomized intervention,  $\beta_{PP}$  is identified by comparing treated parents to control group parents,  $\gamma_P$  and

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<sup>6</sup>Note that the model allows for salience impacts on quality measures families received information about and quality measures they did not. The latter would occur because families re-orient their demand in response to the information, affecting utility weights for both measures.

$\mu_P$  are identified by the willingness to travel among control group parents and auxiliary survey data for the moment  $\mu_P$ .

The decomposition has intuitive implications. For example, assume that families have a taste for both peer and school quality,  $\gamma_P > 0$  and  $\gamma_S > 0$ . Then obtaining information about peer quality will revise beliefs downward (upward) if families overestimate (underestimate) peer quality at baseline. In the case where they overestimate peer quality,  $\mu_P > 0$ , families downward revision of peer quality beliefs will appear as if there is an apparent decrease in tastes for peer quality, all else equal, and hence the negative sign. The opposite is true if they overestimate peer quality at baseline.

Similar expressions can be derived for those receiving only the school quality treatment; see Appendix B for the details. Last, among those in the treatment group receiving both measures of quality, we have

$$\begin{aligned} E[\Delta WTT_{iPB}] &= \frac{\beta_{PB} - \gamma_P \mu_P}{\lambda} \\ E[\Delta WTT_{iSB}] &= \frac{\beta_{SB} - \gamma_S \mu_S}{\lambda}. \end{aligned} \tag{4}$$

The model allows for the utility weight of one attribute to be affected by information about another and this is also discussed in further detail in Appendix B.

Most importantly, Equation 3 and Equation 4 allow for a decomposition of treatment effects into a salience and information updating channel. This provides perspective into the underlying mechanisms at play that produce changes in behavior from information campaigns. I design a survey that measures the relevant moments for the decomposition of both direct and indirect effects. And more generally, I design an experiment oriented around this conceptual framework to identify preference impacts and report the implied decomposition in addition to reduced-form effects.

## 4 Experimental Design

### Timeline

I incorporate a survey and information provision into a typical application cycle discussed in Section 2. The four phases that summarize the experiment are (i) the baseline survey, (ii) the information intervention, (iii) deliberation, and (iv) application submission. The survey distribution happens before the application cycle begins so that it can document parents' beliefs and preferences before the intervention. Information is distributed before applications are collected and well before the deadline. The wide interval of time between information and submission allows parents to internalize the information and deliberate among themselves. After the deliberation process, parents submit applications and the intervention is complete.

### Baseline Survey

The survey serves two purposes. The first is to gain general insight about parents' awareness of the program, their options, and factors that matter to them in the school choice process. Although the program has existed for nearly 10 years and is neighborhood based, parents may

still be unaware of the options it provides. Second, elicited baseline beliefs and preferences are informative for the empirical analysis. In Section 3, I showed that utility weight treatment effects consist of a mixture of preference/salience impacts and information updating. With beliefs data, we can decompose treatment effects to shed light on the factors contributing to changes in choices.

The survey distribution changed in each wave. In the first year, only a paper survey was issued to students in their eighth-grade homeroom classrooms; in the second wave, both the paper and digital surveys were distributed.<sup>7</sup> The digital survey was messaged to families via internal district messaging services. While the survey distribution methods changed across waves, the questions remained constant. Efforts to digitize the paper surveys produced few surveys with enough signal to use in the paper, so the survey results in this paper consist of survey evidence from the second wave in digital format.

While there is precedent eliciting beliefs about peer or school quality in isolation (Ainsworth et al., 2023), there are substantial hurdles in eliciting beliefs about each jointly. Effective messaging that succinctly explains the differences between peer and school quality is challenging to produce. I addressed these belief elicitation challenges in two ways. First, focus groups with LAUSD parents were conducted along with piloting different messages on Amazon MTurk (see Appendix Section C.2 for summary statistics from the piloting). The results from the pilot were mimicked during focus group discussions. Extensive piloting suggested IA as the most effective term for peer quality and AG as the most effective term for school quality. The term IA aims to signal that it is a measure of peer quality that is less associated with incumbent school inputs as it is captured as students enter the school. In contrast, AG clearly signals that it is a measure of students' academic progress occurring during their tenure at the school. This choice of messaging avoids having to use terminology such as value-added, which is arguably more challenging to describe, but still conveys the message that one measure is about growth and another is about a level.

Second, I complement the messaging decision with instructional videos that further aid families' understanding of the quality measures in the intervention and in the survey. The videos aim to provide visual descriptions of the differences between IA and AG and thus more clearly delineate the differences. The paper surveys contained a QR code linking respondents to the video, while the digital version contained an embedded version right before respondents were asked about beliefs. Figure 1 displays some relevant frames from the two-minute video.

Frame (a) conveys that the video was produced in collaboration with the ZOC and LAUSD, and frame (b) introduces the two terms IA and AG. Frame (c) associates IA with a measure that captures achievement as students enter school and is aided by a graphic showing students entering a school. Frame (d) associates AG with a dynamic measure happening during a students' tenure at the school and is aided by a graphic depicting student progress. Frame (e) succinctly highlights the differences between each and is agnostic about nudging families in any direction, and frame (f) highlights that families should also consider other non-test-score-based school attributes. The combination of the messaging and the instructional video helps families

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<sup>7</sup>Every year, LAUSD administers the School Experience Survey to every student and parent in the district. The school district believed a paper version would yield the highest response rate but that was incorrect.

understand the objectively different measures of peer and school quality that the survey aims to elicit beliefs about.

## Defining School and Peer Quality

The measures of school and peer quality are conceptually tied to a constant effects potential outcome model of achievement.<sup>8</sup> IA is calculated as the implied peer quality estimates derived from a model described in Appendix D, and AG is the estimated school value-added from the same model. Given the lack of quasi-experimental variation in school assignment, the model is estimated via ordinary least squares.<sup>9</sup> I convert each quality measure to its percentile rank among all other LAUSD schools. With these measures, I can construct the various versions of the zone-specific treatment letters and serve as a benchmark for the beliefs elicited in the baseline survey.<sup>10</sup>

## Randomization

The randomization strategy is designed to answer two questions. How responsive are parents' choices to information and variation about different measures of school quality? How important are social interactions in the school choice process? To answer the latter question, I employ a two-stage randomization procedure used to study spillovers (Andrabi et al., 2020, Crépon et al., 2013). The key feature of spillover designs is that there are control group participants in close proximity to other treated participants, whom researchers can compare to control group participants without potential exposure to other treated participants. Any treatment effects are due to treatment effect spillovers, which in this setting amounts to social interactions generating a diffusion of information to untreated parents. To answer the first question, I cross-randomize information about peer and school quality.

The randomization process occurs within separate ZOC markets or zones, with the first randomization layer occurring at the school level and the second at the individual level. Each zone is considered a separate market and has different middle schools that feed into the zone.<sup>11</sup> Students from a set of schools that uniquely feed into a zone have the same effective market of schools to choose from, so each block of schools is a different experiment.<sup>12</sup>

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<sup>8</sup>This paper omits potential match quality. In general, there is mixed evidence about the empirical relevance of match quality, with Bau (2022) finding important equilibrium implications. Other evidence in the United States tends to find it explains a relatively small share of the variation in outcomes (Abdulkadiroğlu et al., 2020, Campos and Kearns, 2023), with more recent evidence of its importance for the choice between remote and in-person instruction (Bruhn et al., 2023).

<sup>9</sup>Campos and Kearns (2023) find that school quality is forecast unbiased in Los Angeles, and I report similar findings in Appendix D.

<sup>10</sup>Peer effects potentially influence AG estimates. In Appendix D, I show that a variety of student covariates are unrelated to value-added estimates. In addition, I report the rank-rank correlations between the estimates I use and estimates that regression-adjust, showing both measures produce qualitatively similar results. The two pieces of evidence demonstrate that peer effects are not a first-order concern in this setting, contributing to the mounting mixed evidence regarding peer effects on academic achievement (Sacerdote, 2014).

<sup>11</sup>Cross-zone enrollment is negligible, so each zone is effectively a separate market.

<sup>12</sup>Not all zones have three feeder middle schools, so I create blocks based on the proximity and size of the feeder middle schools. This occurs for a total of four zones for which I create two additional blocks. Also, the number of feeder middle schools in a zone is not always divisible by three. Any residual feeder middle schools remain as pure control middle schools, and therefore the control group is larger than the treatment groups by design.

The first stage of the randomization assigns each group of feeder middle schools into either a high-saturation, low-saturation, or pure control school. The saturation level indicates the share of parents receiving information about a given measure of information, where high corresponds to 50% and low corresponds to 30%. In this respect, there are market-specific school-level experiments with two treatments,  $H$  and  $L$ .

Within each treated school and conditional on their assigned saturation level, the second randomization layer cross-randomizes the different information treatments. The individual-level randomization coupled with the school-level experiment helps to identify intent-to-treat effects for households directly receiving information and for households indirectly receiving information (a spillover effect) by comparing treated households (direct and indirect) to households in the pure control school, where no one received any information.<sup>13</sup>

Figure 2 provides a visual representation for the experiment in the Bell Zone of Choice. Elizabeth Middle School (MS) is randomly assigned to high saturation (treatment  $H$ ), where  $\pi^h$  share of households receive each treatment, and Ochoa MS is assigned to low saturation. Nimitz is the pure control school, highlighted by the red arrows. Among treated schools, the two information treatments are cross-randomized with the share receiving each determined by the school-level saturation levels. This design has a total of eight treatment statuses, one for each information- and saturation-specific treatment, and each treatment status is identified relative to households in the pure control school.

## Treatment Letters

Families with children enrolled in either high- or low-saturation treatment schools can potentially receive treatment letters. Following decisions determining terms in the survey, I refer to peer quality as IA and value-added as AG. Some treated families receive information about IA, others receive AG, and some receive both.

Figure 3 displays example treatment letters for the Bell Zone of Choice in both English and Spanish. The design of the letters is similar to other studies (Corcoran et al., 2018, Hastings and Weinstein, 2008). At the top of each letter is a brief description of what it contains, followed by a list of schools corresponding to a recipient's particular zone. A key difference in these treatment letters from the past literature is the randomized order of schools in the list. The motivation for the randomization is to detect potential order biases, an issue that may affect treatment effect estimates of past studies. There are two other versions of the letters not displayed in Figure 3 that are identical but just report information about one measure of quality.

## Data

The data for this paper come from the LAUSD and the ZOC office. The starting point for the analysis is administrative data that LAUSD collects for all students in the district, including demographics, achievement records, addresses, and other outcomes. These data are linked to data collected by the ZOC, including student rank-ordered lists and applications. The experi-

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<sup>13</sup>Feeder school enrollment is mostly neighborhood based, so it is unlikely that treatments within a zone to the pure control school are contaminated. Treatment being at the school level mostly ensures that any neighborhood interactions occur between middle school parents with children enrolled in the same school.

mental sample contains students residing within ZOC boundaries and attending a feeder middle school during the eighth grade. In 2019, there are 13,015 students meeting this requirement and slightly fewer in 2021.<sup>14</sup> These students are not a random sample from the LAUSD population.

Table 1 reports descriptive statistics of eighth-grade students enrolled in LAUSD schools in fall 2019. The typical ZOC student is noticeably different from the typical eighth-grade student elsewhere in the district. This student is entering high school performing roughly 21%–25% of a standard deviation more poorly on math and reading scores than the typical non-ZOC student. Roughly 6% of ZOC parents have earned a four-year degree, and 97% of ZOC students are classified as poor. They are also more likely to be classified as English learners. In addition to these socioeconomic differences, there are vast racial and ethnic differences. Eighty-six percent of rising ZOC students are classified as Hispanic compared to 68% elsewhere in the district. The approximate racial and socioeconomic homogeneity of ZOC students was similar for past cohorts studied in Campos and Kearns (2023). While these students are notably different from the LAUSD population, treatment assignment occurs within the experimental sample.

## Balance

Table G.1 reports balance for the school-level randomization. Across 52 feeder middle schools, 16 get randomly assigned to the low-saturation treatment, 16 get randomly assigned to the high-saturation treatment, and 20 remain as pure control schools. There are minimal differences between treated and pure control schools across an array of school attributes, including achievement and various demographic characteristics. Special education status is a notable omission that is not balanced, but joint tests fail to reject the null hypothesis pointing to an imbalance by chance.

Table G.2 reports balance for the student-level randomization conditional on saturation status. These balance checks are limited to the sample of low- and high-saturation status schools as pure control schools do not contain any treated families. Mirroring the school-level balance checks, the randomization procedure produces a balanced sample across an array of student baseline outcomes and characteristics, including achievement and demographic characteristics.

Both tables point to the success of the randomization process. Throughout the analysis, however, I still control for the reported baseline covariates to increase precision in the estimates.

## 5 Reduced-Form Results

In this section, I begin by reporting experimental difference-in-difference estimates, where I initially do not distinguish between different treatment types and emphasize cluster-specific effects and corresponding spillover effects. I then focus on models that ignore saturation clusters but do distinguish between treatment types. The combination of reduced-form results emphasizes the importance of social interactions from different perspectives. Additional evidence is reported in Appendix G.2.

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<sup>14</sup>These counts correspond to assignments made just before the semester starts. Some students may switch schools after that, but attrition or changes are minimal.

## 5.1 Difference-in-Differences

I organize the empirical analysis in a difference-in-differences model that compares changes in outcomes between treated, both direct and indirect, parents and parents in pure control schools. There are a few advantages to the difference-in-differences approach. To begin, there is a boost in statistical precision due to the absorption of unobserved preference heterogeneity across treatment groups. Second, there are convenient falsification tests that implicitly test for balance on pre-intervention trends in outcomes of interest. For a given outcome, I consider the following specification

$$Y_i = \alpha_{z(i)t(i)} + \alpha_g(i) + \gamma' X_i + \sum_{k \neq -1} \left( \underbrace{\beta_{Lk} D_{L(i)} \times Post_{k(i)} + \beta_{Hk} D_{H(i)} \times Post_{k(i)}}_{\text{High and Low Treatment Groups}} \right. \\ \left. + \underbrace{\psi_{Lk} C_{L(i)} \times Post_{k(i)} + \psi_{Hk} C_{H(i)} \times Post_{k(i)}}_{\text{High and Low Spillover Groups}} \right) + u_i \quad (5)$$

where  $\alpha_{zt}$  are zone-by-year effects,  $\alpha_g$  are treatment group fixed effects,  $D_{L(i)}$  and  $D_{H(i)}$  are low- and high-saturation treatment indicators,  $C_{L(i)}$  and  $C_{H(i)}$  are low- and high-saturation spillover group indicators, and  $Post_{k(i)} = \mathbf{1}\{t(i) - 2019 = k\}$ . The  $\beta_{Lk}$  and  $\beta_{Hk}$  terms capture difference-in-difference estimates relative to the year before the first experimental wave (2019) for low- and high-saturation groups, respectively, and  $\psi_{Lk}$  and  $\psi_{Hk}$  are defined similarly for parents in the spillover group. All parameters are identified by comparing changes in application behavior between applicants in the respective groups and applicants in pure control schools. As previously mentioned, this approach provides improvements in precision relative to the static experimental specification.<sup>15</sup> Standard errors are robust and clustered at the school level and Appendix G.2 reports randomization-inference-based p-values.

Figure 4 reports estimates of Equation 5, considering top-ranked school incoming achievement and achievement growth as outcomes. In both panels, gray lines correspond to estimates for effects for those in low-saturation schools, and maroon lines correspond to effects for those in high-saturation schools. Dashed lines correspond to treated applicants and solid lines correspond to spillover applicants.

Panel (a) reports effects on most-preferred achievement growth. The maroon lines demonstrate that applicants in high saturation schools increased their demand for schools with higher AG in both experimental waves. Both direct and indirect treatment effects are similar, with larger effects in the second experimental wave. In contrast, the gray lines demonstrate no effects among applicants in low-saturation schools. Across all groups, there is no evidence that treated groups' application behavior trended differently leading into the intervention. Turning to Panel (b), the evidence shows that demand for IA was unaffected by the intervention.

The results in Figure 4 emphasize two findings. First, any meaningful changes in demand are reflected by an increase in demand for more effective schools, as captured by achievement growth rankings. Second, social interactions are an important factor contributing to meaningful changes in demand. The importance of social interactions operates through two channels. In the high saturation schools, social interactions facilitated changes in choices among control

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<sup>15</sup>The static results are reported in Appendix G.2 and are similar but less precise.

group parents. In low-saturation schools, the lower prevalence of social interactions led to both treated and untreated parents' lower take-up of the information. This latter finding mirrors the importance of social engagement with information in generating meaningful changes in behavior (Banerjee et al., 2018).

Table 2 reports treatment effects on other school attributes potentially correlated with school incoming achievement and achievement growth. The first two rows report estimates analogous to those displayed in Figure 4, and the subsequent rows consider treatment effects on different school characteristics. The table finds minimal evidence that changes in demand for AG substantially alter other attributes of most-preferred schools, suggesting that the information did not alter families' perceptions about other school attributes in a way that generated changes in demand for those attributes.

### 5.1.1 Heterogeneity

Prior information interventions tend to find that relatively advantaged families and students are more responsive to information, exacerbating existing gaps information interventions aim to address (Cohodes et al., 2022, Corcoran et al., 2018). In the ZOC setting, there is less variation in socioeconomic status but there is variation in student's baseline achievement, so I focus on that. Additional heterogeneity evidence is reported in Appendix G.4.

Table 3 summarizes the evidence. Panel A reports treatment effects on most-preferred incoming achievement for various groups of students categorized based on their baseline achievement levels. Although most estimates are not distinguishable from each other statistically, there is suggestive evidence that higher-achieving families are most responsive to incoming achievement information. It is also worth noting that higher achieving families tend to apply to schools with higher achievement levels. This finding mirrors evidence in Corcoran et al. (2018) in that relatively advantaged families are more responsive to information treatments.

Panel B reports similar evidence for most-preferred achievement growth. To begin, I find that higher-achieving families in the control group rank better schools at the top of their list in terms of their achievement growth. Mirroring the evidence displayed in Figure 4, most impacts are detected among parents in high-saturation schools. In the first experimental wave, I find the most pronounced effects among low-achieving and moderately-low-achieving families, that is, students performing below district averages on standardized exams at baseline. In the second experimental wave, I find mostly similar effects across the various achievement groups. Throughout, however, differences are noisy and indistinguishable from statistical noise so they are suggestive at best. The evidence does suggest that the intervention reduced achievement-based differences in accessing higher-quality schools in the first experimental wave and kept it constant in the second experimental wave.

In Appendix G.4, I report additional heterogeneity evidence. I find limited evidence of heterogeneity with respect to other observable covariates such as special education status, English learner status, and gender. I do find suggestive evidence that White families are the most responsive in terms of changing their demand for achievement growth, but as with most other heterogeneity evidence, the differences are noisy.

## 5.2 Distributional Estimates

The findings reported in Figure 4 and Table 2 do not distinguish between different treatments, masking the fact that families received different information treatments. In this section, I consider a specification that distinguishes between treatment types and assesses how demand for achievement growth and incoming achievement changed across the distribution. I consider distributional regressions of the following form

$$\mathbf{1}\{Y_i \leq a\} = \alpha_{z(i)t(i)} + \alpha_{g(i)} + \gamma' X_i + \beta_P T_{it(i)}^P + \beta_S T_{it(i)}^S + \beta_B T_{it(i)}^B + \beta_C C_{it(i)} + u_i, \quad a \in [a, \bar{a}] \quad (6)$$

where  $\mathbf{1}\{Y_i \leq a\}$  is the cumulative distributive function of an outcome  $Y_i$  at point a point  $a$ ,  $\alpha_z$  is a zone fixed-effect,  $T_{it(i)}^x$  are individual-level treatment  $x$  indicators for  $x \in \{P, S, B\}$ ,  $C_i$  are individual-level indicators for untreated parents in treated schools, and  $X_i$  is a vector of baseline covariates. As in the differences-in-differences model from the previous section, all parameters are identified by comparing changes between treated families and families in pure control schools. This design is a multiple treatment extension of other work studying spillover effects across a variety of domains (Andrabi et al., 2020, Crépon et al., 2013). Standard errors are robust and clustered at the school level and randomization-based inference is reported in Appendix G.2.

Figure 5 reports estimates of Equation 23. Panel (a) begins by demonstrating impacts across the most-preferred school IA. A point reveals the direction and magnitude the cumulative distribution function shifted, so for example, at 40, the probability that a most-preferred school IA ranking was below the 40th percentile decreased by approximately 8 percentage points for the families receiving AG. Treatment effects are remarkably similar across the various treatment groups, including the spillover group. Overall, families tended to shift their most-preferred school choices to schools with lower IA, with much less pronounced changes in markets with high IA schools. While Panel (a) detects that families shifted their choices toward schools with lower IA, these changes are complemented with increased demand for higher AG schools as Panel (b) demonstrates. Similar to impacts on most-preferred IA, treatment effects of untreated parents in treated schools mirror the effects of treated parents. The striking visual evidence in Panels (a) and (b) suggest a community-level convergence moving average demand in a way that rewarded effective schools.

The assemblage of reduced-form evidence is summarized with a few key points. First, imperfect information about school effectiveness is potentially empirically relevant as families changed their choices in response to the intervention. This has been highlighted in Ainsworth et al. (2023) and alluded to in prior research (Abdulkadiroğlu et al., 2020, Beuermann et al., 2022, Rothstein, 2006). It remains to be seen how much of the documented changes are due to imperfect information or salience effects. Second, and in contrast to previous research, I show that when information about both peer and school quality are prevalent, families systematically choose more effective schools without meaningful average changes in their most preferred school peer quality. This evidence suggests that effectiveness-oriented campaigns can orient demand in a way that parents reward effective schools, with implications for school competition and student outcomes (Abdulkadiroğlu et al., 2020, Campos and Kearns, 2023). Third and last, the reduced-

form results reveal that social interactions, that is, parents discussing the information among themselves, are important determinants for own-school choices. The existing literature thus far has provided anecdotes and qualitative evidence about the importance of networks (Fong, 2019, Kosunen and Rivière, 2018); this is the first evidence documenting social interactions matter for individual choices.<sup>16</sup>

The reduced-form results thus far show how choices changed on average and cannot speak to the factors influencing the changes in choices. As discussed in the conceptual framework, some of the changes are due to information updating, while others are due to actual preference changes or salience impacts. In the next section, I add some modest structure to the choice process and combine that with survey data to shed light on the various factors governing the treatment effects.

## 6 Survey Results and Decomposition

The baseline survey elicited baseline preferences and beliefs about school and peer quality. In addition, there were other questions that revealed information about parents' intentions during the school choice process, which are discussed in detail in Appendix C. In this section, I first focus on descriptive evidence on elicited preferences and beliefs. I then return to the experiment, combining the survey results with a slightly more structural approach to shed light on the various factors contributing to the treatment effects.

Throughout, biases are defined in terms of pessimism. Let  $Q_j^x$  be the measured quality of school  $j$  along measure  $x \in \{IA, AG\}$ , and define parent  $i$ 's belief as  $\tilde{Q}_{ji}^x$ . The biases are

$$Bias_{ji}^x \equiv Q_j^x - \tilde{Q}_{ji}^x.$$

### 6.1 Descriptive Evidence

Figure 6 reports a histogram of elicited pessimism for both IA and AG. On average, parents are pessimistic about school AG but are slightly optimistic about school IA. While roughly 50% of parents are pessimistic about AG, only 34% are pessimistic about IA. These patterns are not a consequence of center guessing; Appendix Figure F.4 reports the overlap in estimated deciles and elicited belief deciles. The figure shows substantial overlap between AG beliefs and measured AG, and to a lesser extent the same is true for IA, with both findings indicating that elicited beliefs carry some signal. As this is the first finding in the literature regarding beliefs about both of these measures, it is worth reporting some additional patterns about beliefs.

The pessimism patterns documented in Figure 6 hold across most of the entire rank-ordered list. Figure 7 reports average pessimism across each position of the rank-ordered list. There are four findings that immediately stand out. Throughout the list, parents are more pessimistic

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<sup>16</sup>It is important to contrast social interactions defined in this paper from preferences for peers studied in previous papers (Allende, 2019). While preferences for peers are a form of social interaction in the sense that my demand for an option depends on the composition of students, the findings in this paper are conceptually different. The evidence in this paper compares how actual choices change in response to the information availability of nearby peers, irrespective of the demand for peers. In fact, I find that preferences for peers tend not to be too important in these markets, which is partly explained by the relatively segregated markets in terms of race and income.

about AG than they are about IA. They also get progressively more pessimistic about schools they rank farther down their list, and the patterns is slightly more pronounced for AG. For top-ranked options, parents tend to be optimistic about both IA and AG. They are optimistic about IA across the entire list, while AG optimism shifts toward pessimism at the third-ranked option.

To explore potential differences in beliefs by relative advantage, I use baseline achievement as a summary measure. Figure F.2 reports the relationship between pessimism and students' baseline achievement. Panel (a) reports the relationship for all options, and Panel (b) focuses on the top-ranked option. Perhaps surprisingly, both panels indicate a lack of a relationship between AG pessimism and students' baseline achievement. In contrast, there is a modest achievement gradient for IA, indicating that higher-achieving families have beliefs that are closer to the truth. The latter finding may not be surprising as there are numerous publicly available sources reporting measures similar to IA, and more-resourced families likely access this information at a higher prevalence.

Appendix Table F.3 reports additional correlations between biases and student baseline covariates.<sup>17</sup> I find that college-educated parents tend to underestimate IA both unconditionally and conditional on other covariates, mirroring the correlation between pessimism and baseline achievement. There are some racial and ethnic differences in IA pessimism, but they are not large. Low socioeconomic status parents tend to overestimate IA. Turning to AG pessimism, few student characteristics correlate with it. Hispanic families tend to underestimate AG the most, and few other covariates stand out with meaningful differences.

In summary, there is substantial heterogeneity in beliefs about schools in families' choice sets as displayed in Figure 6. There is additional heterogeneity across the positions of the rank-ordered list. Mean bias, however, is not drastically large, indicating families do a decent job of predicting the quality of their schools along both dimensions. Documenting the presence of imperfect information points to one channel explaining the reduced-form effects in Section 5, but the survey evidence does not speak to the role of salience. In the next section, I pivot to a simple discrete choice setting which allows me to discern between the two likely channels, salience and information.

## 6.2 Impacts on Preferences

The starting point of this analysis is an indirect utility model discussed in the conceptual framework in Section 3. The simple model assumes families take into account both school and peer quality, have a distaste for distance, and have unobserved preference heterogeneity that is known to the family at the time they state their preferences.<sup>18</sup> The information intervention causes families to change the utility weights they assign to the various quality measures, allowing us to estimate the intervention's impacts in terms of changes in families' willingness to travel

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<sup>17</sup>The emphasis in Appendix Table F.3 is on the top-ranked option as that contains the most signal. Appendix C contains a similar table for all options on the rank-ordered list.

<sup>18</sup>Note that this model abstracts away from families' beliefs about admission chances, implicitly assuming the intervention does not affect such beliefs. As discussed further in Section 2, the mechanism choice is not a salient feature of the ZOC setting; families do not know the rules, and the rules are not discussed during information sessions. Therefore, it is unlikely that the intervention caused families to revise their beliefs about admissions chances.

for each measure of quality. Moreover, this analysis allows me to hold constant the treatment effect on one quality measure while studying the other, a feature that is subtle yet important given the correlation structure of the quality measures.

I summarize the intervention's impacts with a model analogous to Equation 2, which focuses on changes in parents' willingness to travel. As alluded to in the previous section, each treatment arm  $t$ 's impacts are summarized  $\beta_{tP}$  and  $\beta_{tS}$ , which nest both information and salience effects. The presence of imperfect information implies families are incorrectly substituting between IA and AG, so information will lead to changes in the weights simply through information updating. At the same time, the intervention makes these attributes more salient to families, potentially changing the importance they assign to the attributes (Bordalo et al., 2013, 2022). Differentiating between these channels is important and informs us more generally about how information interventions tend to work in practice.

The decomposition implied by the distributional assumptions on beliefs implies that for families only receiving only the peer quality treatment, the average change in their willingness to travel is

$$E[\Delta WTT_{iP}] = \frac{\beta_{PP} - \gamma_P \mu_P}{\lambda}. \quad (7)$$

Families receiving school-quality-only treatment have an analogous decomposition:

$$E[\Delta WTT_{iS}] = \frac{\beta_{SS} - \gamma_S \mu_S}{\lambda}. \quad (8)$$

Last, for families receiving both treatments,

$$E[\Delta WTT_{iX}] = \frac{\beta_{XB} - \gamma_X \mu_X}{\lambda}, \quad (9)$$

where  $X$  corresponds to either  $P$  or  $S$ . The decompositions of interest depend on moments from the belief distribution that are measured in the survey. Therefore, with the survey data, I can pin down the portion of the average effect that can be explained by the mean bias in the population, and any residual effect is attributed to salience. Throughout, standard errors are clustered at the school level and estimated via the delta method where appropriate.

Table 4 begins by reporting the intervention's impacts, not discerning between the two channels. The first two columns report utility weight estimates for IA and AG, reported in willingness to travel units (in kilometers).<sup>19</sup> The third column reports a p-value from a test where the null hypothesis is that the estimates in Columns (1) and (2) are equal in a given row.

The first two rows of Column (1) and (2) show that untreated families tend to place a positive weight on IA and AG, with a higher weight on AG that is statically different from the weight on IA (p-value = 0.017). This finding mirrors previous findings documented for earlier ZOC cohorts in Campos and Kearns (2023) but stands in slight contrast to findings in New York from Abdulkadiroğlu et al. (2020) and in Romania from Ainsworth et al. (2023) in that there is a preference for schools with higher causal impacts even after we condition on a measure of peer quality. It is likely that conditions affecting the school choice process vary across settings and help explain the diverse findings. For example, in ZOC markets, there is

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<sup>19</sup>A willingness to travel parameter is estimated by taking the ratio of an estimated utility weight and the distance coefficient. Standard errors are estimated via the delta method.

much less pronounced variation in race and socioeconomic status, a common proxy for peer quality, potentially reducing the weight families place on peer quality.

The subsequent rows show that families receiving information reduce their willingness to travel for IA and increase their willingness to travel for AG, regardless of the information treatment they receive. Mirroring reduced-form evidence, Table 4 shows robust evidence of spillovers with spillover effects statistically equal to information effects.<sup>20</sup> The evidence also reveals that willingness to travel impacts on IA are statistically similar, regardless of the information treatment ( $p\text{-value}=0.73$ ); the same is true for willingness to travel impacts on AG ( $p\text{-value}=0.19$ ). Overall, the evidence in Table 4 demonstrates that families responded to information about AG and IA, leading to choices that increased schools' incentives to invest in inputs that contribute to student learning. And as alluded to in the reduced-form evidence, social interactions are important.

Although the findings discussed above summarize the intervention's effects viewed from the lens of discrete choice framework, there are a variety of forces at play. To begin, the information intervention was motivated to address underlying information frictions so families choices may have changed through an information channel. At the same time, the intervention makes both IA and AG salient to families (Bordalo et al., 2013, 2022) potentially causing them to re-prioritize their relative importance. With these two channels in mind, the decomposition motivated above allows one to distinguish between these two channels in an admittedly crude manner. Distinguishing between these two channels is important from a policy perspective and their general implications. If the effects mostly reflect information updating, then that emphasizes current allocative inefficiencies due to imperfect information. In contrast, if the effects are mostly due to salience, then this emphasizes the potential role that information campaigns play in affecting school incentives and outcomes, such as achievement and segregation patterns.

Figure 8 reports estimates of the decomposition. Panel (a) reports estimates of the decomposition parents receiving treatments and Panel (b) corresponds to parents in the spillover group. The first two bars in each figure correspond to IA WTT treatment effects, while the subsequent two bars correspond to AG WTT treatment effects. The estimated information updating component is represented by the gray bars and the salience component is represented by the black bars. The takeaway from Figure 8 is that salience effects explain most of the changes in choices, a consequence of bottom-up attention discussed in Bordalo et al. (2013) and Bordalo et al. (2022). In other words, the information reoriented how families thought about school and peer quality, leading to a relative increase in the demand for AG above and beyond what can be explained by baseline IA and AG biases. In fact, information updating proves to correspond to a small share of the overall changes. This latter finding is a consequence of families' beliefs not being too far off from the truth on average. This final piece of evidence suggests that the intervention's effects operated by re-orienting demand in a way that families increase their valuation of effective schools and decrease their valuation of peer quality.

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<sup>20</sup>Tests of equality between each treatment arm and spillover arm fail to reject equality.

## 7 Impacts on Outcomes

The evidence thus far demonstrates that the intervention caused an increase in the demand for effective schools and attenuated demand for peer quality. In this section, I focus on how the intervention affected outcomes. I start by studying the potential limiting effects of capacity constraints by looking at students' enrollment patterns in high school. I then focus on two sets of outcomes. The first corresponds to student-level responses to the district's annual School Experience Survey (SES), capturing measures of socio-emotional development as in Jackson et al. (2020) and other measures of overall satisfaction. I denote these as non-cognitive outcomes. The second focuses on standardized test scores, but due to the nature of testing in California is limited to only include the first experimental wave.<sup>21</sup>

Appendix Figure G.3b demonstrates effects on *enrolled* school attributes. Mirroring the most preferred impacts displayed in Figure 4, we find increases in the AG of enrolled schools among those in high saturation schools. Treatment effects on enrolled school IA are mostly indistinguishable from statistical noise and small in magnitude. The evidence shows that the intervention was successful in increasing demand for effective schools, which also led to enrollment in more effective schools.

Table 5 focuses on other outcomes of interest drawn from the SES and test score data. The SES is administered to students every year to students in most grades and all students in high school. I categorize the wealth of questions into five indices mostly following Jackson et al. (2020). The first is a happiness index measuring students' levels of satisfaction at the school where they enroll in ninth grade. The second is an interpersonal index including questions about students' proclivity to get along with others and those whose points of view differ. The school connectedness index includes questions like "I feel like I am part of this school." The Academic Effort index includes questions such as "When learning new information, I try to put the ideas into my own words" and "I come to class prepared." The Bullying index includes a host of questions covering teasing, physical bullying, and cyberbullying. Each index is standardized to be mean zero with a standard deviation equal to one. Appendix E discusses the indices with greater detail. Test score outcomes correspond to eleventh grade, the only year high school students are tested. The focus on eleventh grade limits the test score coverage to students part of the first experimental wave.

Panel A of Table 5 focuses on survey-based non-cognitive outcome measures. Across all survey measures, treatment effects for students in low-saturation schools tend to be indistinguishable from statistical noise. Among students in high-saturated schools, treatment effects are most pronounced for the 2021 cohort. The happiness index reveals that students in high saturation schools in the most recent experimental wave, experience an increase in their school satisfaction index of roughly 7 percent of a standard deviation. The interpersonal skills index also improved, as did the school connectedness, academic effort, and bullying indices, with index improvements ranging between 4 percent to 9 percent of a standard deviation.

These findings contribute to the mounting evidence that schools and teachers impact an array of outcomes, not strictly limited to cognitive scores (Beuermann et al., 2023, Jackson,

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<sup>21</sup> LAUSD high school students only take standardized exams in eleventh grade, so that is the lone year for which there is available test score data.

2018, Jackson et al., 2020, Petek and Pope, 2023, Rose et al., 2022). The evidence in Panel A suggests that by changing parents' choices, treated students were more likely to enroll in more effective schools which also affected their non-cognitive and socio-emotional outcomes. Indeed, Appendix Table E.1 demonstrates that school quality is strongly correlated with the four socio-emotional outcome measures defined in Jackson et al. (2020). As for happiness, the intervention can at worst only lead to more informed decisions and overall improvements in satisfaction levels. Therefore, the information not only changed school choices but also affected outcomes of significant importance.

Panel B of Table 5 focuses on cognitive impacts. Test score impacts are more nuanced in this setting for two reasons. First, test score outcomes for the 2021 cohort are available in 2025, so I am restricted to focusing on the 2019 cohort. Second, and most importantly, the COVID-19 pandemic interfered with the 2019 cohorts educational experience. The 2019 cohort's first high school year was almost entirely remote, which has been shown to have varying but mostly negative consequences (Bruhn et al., 2023, Goldhaber et al., 2023, Jack et al., 2023). For these reasons, it is not surprising to not find much of an impact on test score outcomes given the multitude of factors affecting student learning in nuanced ways during the initial cohort's high school years. The non-cognitive impacts, however, emphasize that while changes in effort and motivation may not have materialized into increases in test scores, more informed parental decisions and students' enrollment in more effective schools led to richer experiences in high school.

## 8 Discussion

The assorted set of results in this paper has three broad implications. The first relates to our understanding of parents' preferences and what we can and cannot learn from this intervention. The second relates to the implications of social interactions for educational inequality and access to effective schools. The third relates to the role of salience effects in information interventions more broadly. I discuss each now in turn.

The evidence in this paper shows that when both peer and school quality is widely available, any measurable changes in demand are oriented toward higher value-added schools. While the evidence in this paper demonstrates that families may systematically prefer school quality over peer quality, there are a few additional points worth addressing. My findings do not speak to whether or not families "max" out on school effectiveness (Ainsworth et al., 2023). The multidimensional nature of a school's production function makes it plausible that families need not maximize only school effectiveness (Beuermann et al., 2022). The findings suggest that effectiveness-oriented information campaigns can reorient demand in a way that compels schools to invest in inputs that contribute to student learning *and* that parents may prefer this information over other information that mostly reflects student selection. This type of demand-side behavior may motivate active school quality-based information campaigns that can potentially improve student outcomes. In this study, the information campaign mostly improved non-cognitive outcomes partly due to the disruptive nature of the COVID-19 pandemic on student learning.

Measurable changes in demand were facilitated through social interactions, which has implications for how we interpret observed demand in general. To begin, the spillover results provide evidence of an externality in school choice that is distinct from a preference for peers that has received much attention in the empirical (Allende, 2019, Rothstein, 2006) and theoretical literature (Cox et al., 2021, Leshno, 2021). Consequently, the prevalence (or lack) of social interactions can mediate observed differences in preferences and contribute to differences in access to effective schools as differentially connected families learn at different rates (Golub and Sadler, 2017).

In particular, my findings demonstrate that the preference for peers may be attenuated in settings with widespread school quality information and that demand externalities may operate through information acquisition *before* centralized matches occur and become less dependent on assignments. This pivots the discussion to the endogenous information acquisition stage (Chen and He, 2021, Harless and Manjunath, 2015, Immorlica et al., 2020, Maxey, 2021) and emphasizes network-based externalities. For example, if parents' information sets are shaped by their networks, then common findings that disadvantaged families have a lower taste for academic quality (Hastings et al., 2006) or less take-up of information (Cohodes et al., 2022, Corcoran et al., 2018, Finkelstein and Notowidigdo, 2019) can be potentially explained by biased networks among the disadvantaged.<sup>22</sup> Information campaigns that further motivate interactions can potentially reduce existing school quality gaps (Banerjee et al., 2018).<sup>23</sup> Incorporating network-based preference externalities is an important avenue for future theoretical and empirical research.

The beliefs data allowed me to shed light on factors influencing treatment effects, something information interventions are typically silent about (Haaland et al., 2020). The crude decomposition I provide demonstrates that information campaigns generate a meaningful share of treatment effects through salience, and perhaps to a lesser degree, information updating. Information interventions, however, are commonly motivated to allow consumers to make more informed decisions and reduce information gaps. The findings suggest that information interventions play a powerful role in shaping families' preferences and choices, above and beyond addressing information gaps that were present in ZOC markets. At one extremity, this suggests that information interventions can be used as tools to reorient demand in a way consistent with policymaker goals. For example, policymakers interested in successful school choice policies can make school-quality information widely available, serving a dual purpose of eliminating information gaps and reorienting demand to potentially improve student outcomes.

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<sup>22</sup>In the ZOC setting, there was less scope for income- or race-based inequality in take-up, but there is suggestive evidence that the information intervention decreased achievement-based differences in preferences for effective schools (see Appendix G.2).

<sup>23</sup>Widespread effectiveness information campaigns potentially introduce some issues, however. For example, they can realign enrollment and have consequential effects on school segregation, as recent laboratory experiments have shown (Houston and Henig, 2021). Recent work by Angrist et al. (2022) also highlights some potential trade-offs.

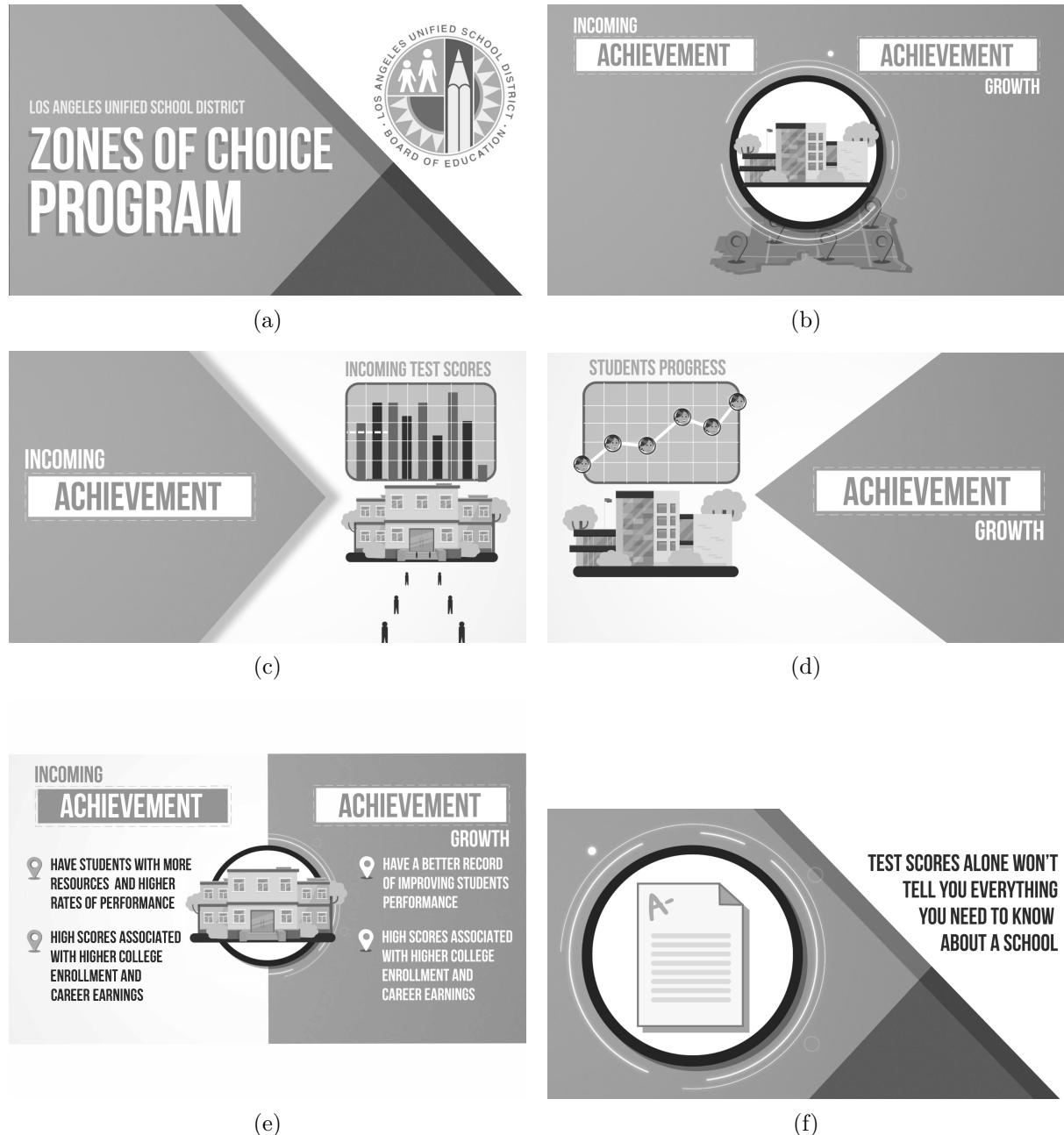
## 9 Conclusion

Parents' choices govern the success of school choice initiatives and it is paramount to understand both their preferences and factors that mediate their choices. This paper provides survey and experimental evidence about parents' beliefs and valuation of effective schools while also providing experimental evidence about a network-based externality in preference formation. The experimental evidence is the first attempt to depart from revealed preference arguments that implicitly assume perfect information (Abdulkadiroğlu et al., 2020, Ainsworth et al., 2023, Beuermann et al., 2022, Campos and Kearns, 2023) and is the first to show the relevance of social interactions for preference formation discussed in a nascent theoretical literature (Harless and Manjunath, 2015, Immorlica et al., 2020, Maxey, 2021).

The survey results reveal that families are pessimistic about school quality and are optimistic about peer quality among schools in their neighborhood-specific choice sets. Information provision in these markets shows that families receiving any information increase their demand for schools of higher quality in a way that is consistent with them rewarding effective schools. Social interactions and spillovers are vital mediators governing new market-level consensus of desirable schools. A decomposition of my estimates suggests that salience or preference impacts account for most of the changes in choices, with information-updating and correlated beliefs playing smaller roles. These findings demonstrate that effectiveness-oriented campaigns can produce meaningful changes in demand and reorient school incentives in ways that generate positive outcomes for students.

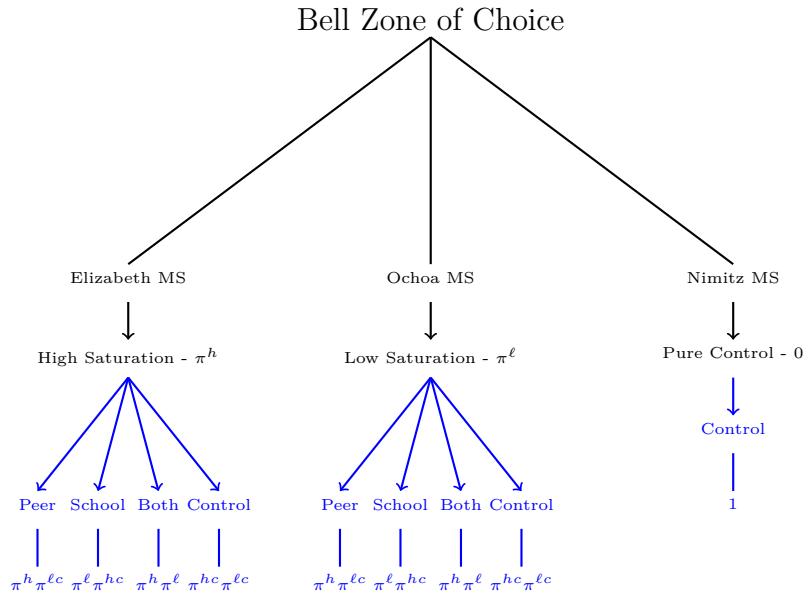
This paper advances what we know about parents' beliefs and preferences but is limited along certain dimensions. The results speak to short-run partial equilibrium effects, providing, at best, suggestive evidence for potential supply-side responses. Moreover, the findings are silent about how changes in demand can affect school segregation patterns, the role of congestion, and the importance of social networks in general equilibrium. These are all important avenues for future research.

Figure 1: Video Frames



*Notes:* This figure displays six frames from the video distributed alongside the baseline survey. Frame (a) is the introduction slide, indicating that this message comes from the ZOC office and the LAUSD. The second frame introduces the two quality measures and juxtaposes them as distinct objects. Frame (c) provides some visualization indicating that incoming achievement captures student achievement at the time they enter school and thus are less affected by the school's inputs. Frame (d) depicts achievement growth as something dynamic and occurring during the students' tenure at the school. Frame (e) highlights some differences with the aim to be agnostic about which is better, and Frame (f) qualifies the information with a statement nudging families to also consider other non-test-score-based attributes.

Figure 2: Assignment to Treatment



*Notes:* This figure describes the randomization if the block size was three. There are certain zones with more than three feeder schools but less than six, so the block sizes were either three or four schools.  $\pi_h$  is the saturation level of high-saturation schools, and  $\pi^\ell$  is the saturation level for low-saturation schools.  $\pi^{hc}$  and  $\pi^{\ell c}$  are 1 minus the  $\pi^h$  and  $\pi^\ell$ , respectively.

Figure 3: Treatment Letter Example: Bell Zone of Choice

<b>Bell Zone of Choice</b>					
We determine the quality of a school based on students' average scores on state exams					
<p>This measure has two parts you should consider, one which measures the school's ability of attracting high scoring students, and the second is the school's impact on test score growth.</p> <p>Therefore, a school's observed quality is a combination of both their students' incoming achievement and the achievement growth they obtain while at the school. Some parents may prefer schools with high incoming achievement, and others may prefer schools with high achievement growth. The table below provides each school's district-wide ranking.</p> <p><b>We hope you use this information when choosing the right school for your student.</b></p>					
School	Incoming Achievement	Achievement Growth*	Campus Location	Type of School	Escuela
Science, Technology, Engineering, Arts & Math (STEAM) High School	76	94	Legacy HS	Small School	Preparatoria de Ciencia, Tecnología, Ingeniería, Artes y Matemáticas (STEAM)
Visual & Performing Arts (VAPA) High School	74	67	Legacy HS	Small School	Preparatoria de Artes Visuales y Técnicas (VAPA)
Health Academy	58	58	Elizabeth LC	Small Learning Community	Academia de Salud
Multilingual Teacher Academy	63	50	Bell HS	Linked Learning Academy	Academia de Artes y Oficios Enlazado/ Carrera de Profesores Multilingües
STEAM	47	82	Maywood Academy	Small Learning Community	Academia de Ciencia, Tecnología, Ingeniería, Artes y Matemáticas (STEAM)
Information Technology Academy	49	53	Elizabeth LC	Small Learning Community	Academia de Información Tecnológica
Arts Language & Performance Humanities Academy	63	50	Bell HS	Linked Learning Academy	Academia de Artes, Idiomas, Artes Escénicas y Humanidades
9th Grade Academy	47	82	Maywood Academy	Small Learning Community	Academia del 9º Grado
Bell Global Studies	63	50	Bell HS	Small Learning Community	Estudios Globales

<b>Zona de Opción Bell</b>					
Determinamos la calidad de una escuela en función de los punitajes promedio de los estudiantes en los exámenes estatales					
<p>Esta medida tiene dos partes que debe considerar, una que mide la capacidad de la escuela para atraer a estudiantes con altas calificaciones, y la segunda es el impacto de la escuela en el crecimiento de las calificaciones y las pruebas. Por lo tanto, la calidad observada de una escuela es una combinación tanto del rendimiento entrante de sus estudiantes como del crecimiento de logros o crecimiento del rendimiento que obtienen mientras están en la escuela. Algunos padres pueden preferir escuelas con alto rendimiento entrante, y otros pueden preferir escuelas con alto crecimiento de logros. A continuación proporcionamos la clasificación de cada escuela comparado a todas las escuelas en el distrito.</p> <p><b>Esperamos que utilice esta información al elegir la escuela adecuada para su estudiante.</b></p>					
School	Incoming Achievement	Achievement Growth*	Campus Location	Type of School	Escuela
Science, Technology, Engineering, Arts & Math (STEAM) High School	76	94	Legacy HS	Small School	Preparatoria de Ciencia, Tecnología, Ingeniería, Artes y Matemáticas (STEAM)
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9th Grade Academy	47	82	Maywood Academy	Small Learning Community	Academia del 9º Grado
Bell Global Studies	63	50	Bell HS	Small Learning Community	Estudios Globales

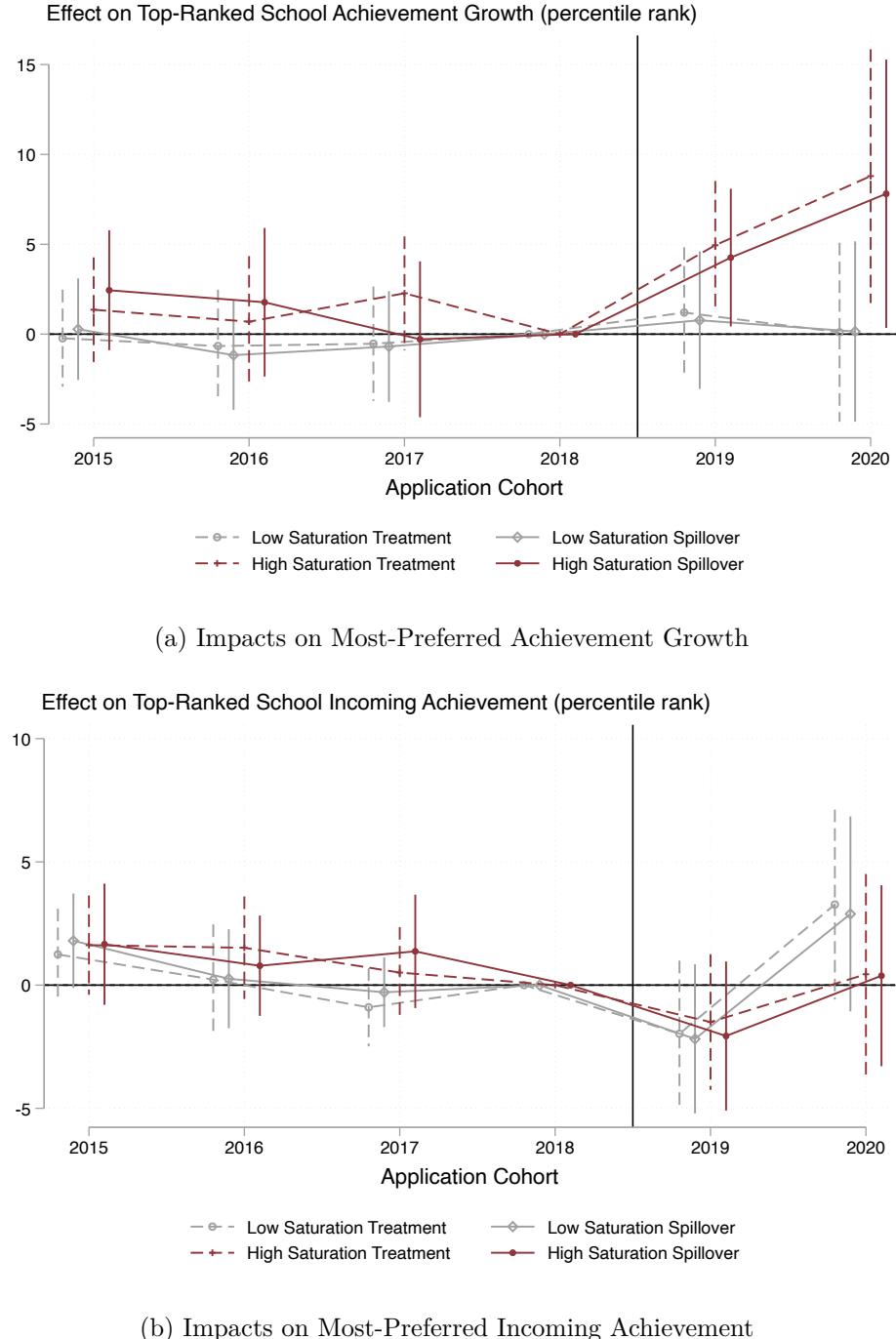
  

<b>Rendimiento Entrante</b>					
El rendimiento entrante de una escuela es el punitaje promedio de sus estudiantes cuando ingresan a la escuela.					
<p><b>Crecimiento de logros</b></p> <p>Medimos la capacidad de una escuela para mejorar los punitajes de los exámenes midiendo el crecimiento de sus estudiantes entre los exámenes de ingreso y el onceavo grado.</p>					
School	Incoming Achievement	Achievement Growth*	Campus Location	Type of School	Escuela
Science, Technology, Engineering, Arts & Math (STEAM) High School	76	94	Legacy HS	Small School	Preparatoria de Ciencia, Tecnología, Ingeniería, Artes y Matemáticas (STEAM)
Visual & Performing Arts (VAPA) High School	74	67	Legacy HS	Small School	Preparatoria de Artes Visuales y Técnicas (VAPA)
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9th Grade Academy	47	82	Maywood Academy	Small Learning Community	Academia del 9º Grado
Bell Global Studies	63	50	Bell HS	Small Learning Community	Estudios Globales

\*Schools' Incoming Achievement and Achievement Growth are provided in percentiles. For example, if a school has a incoming achievement of 55, this means that the average test scores of its incoming students are better than 55 percent of other high schools in LAUSD. Similarly, if achievement growth is 75, then the school's ability to improve test scores is better than 75 percent of high schools in LAUSD.

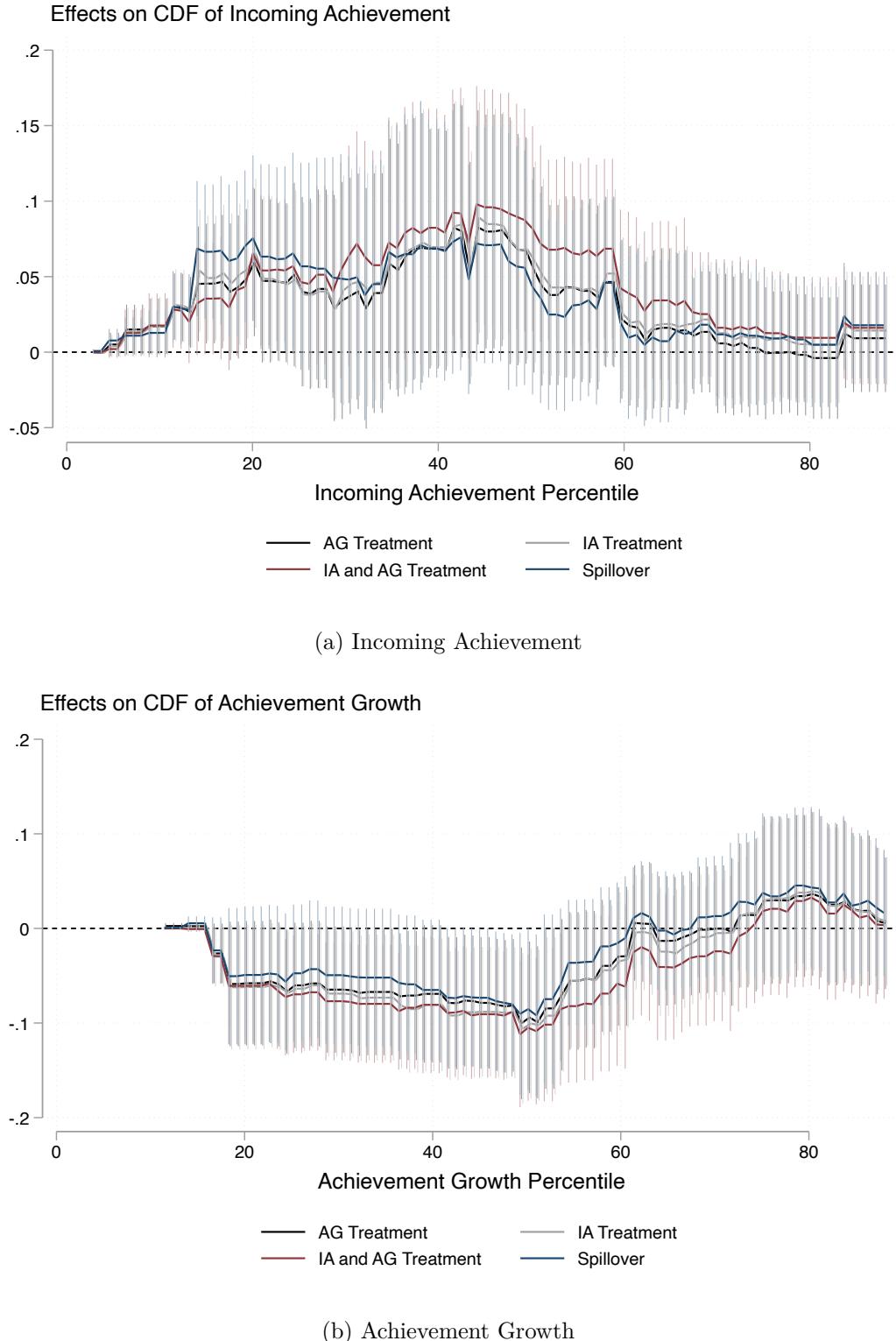
**Notes:** The front page of the letter is in English, while the second page is in Spanish. The letters list all the relevant schools for the Zone of Choice that the feeder middle school feeds into. The letters provide a simple and short explanation about incoming achievement and achievement growth, along with a quick summary with some graphics that aid in understanding the differences.

Figure 4: Difference-in-Difference Estimates



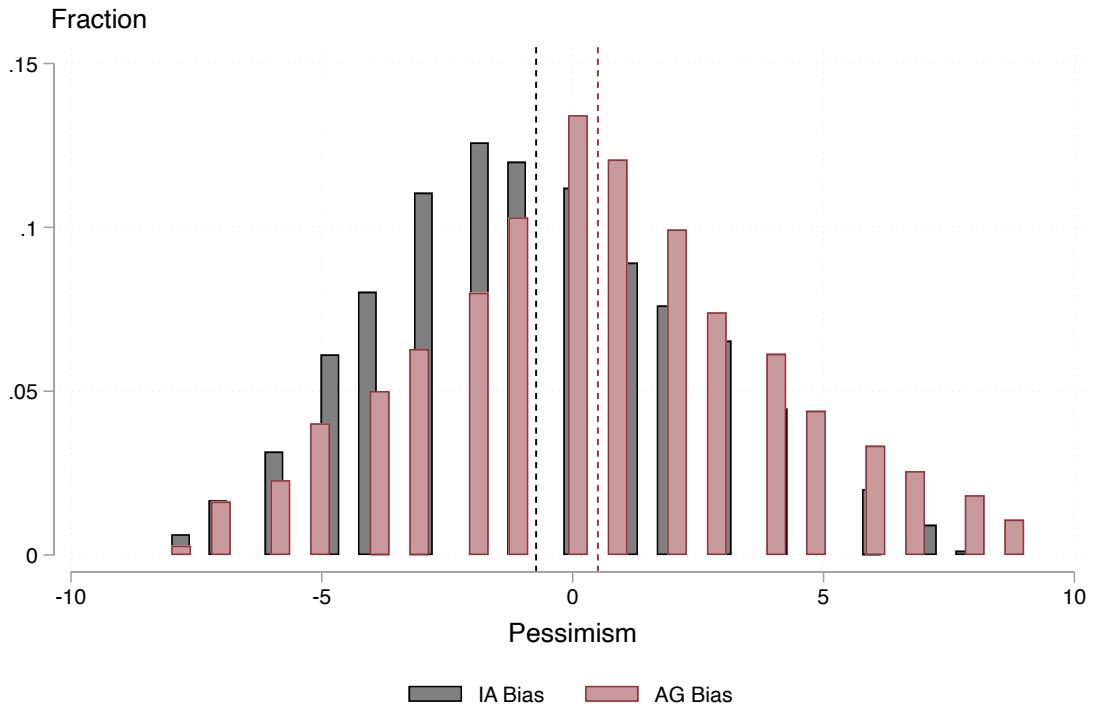
*Notes:* This figure reports difference-in-difference estimates from models considering four different school-level treatments. These estimates come from regressions of most-preferred school attributes—either incoming achievement or achievement growth—on year and treatment group fixed effects along with treatment group indicators interacted with event-time indicators. All estimates are identified by comparisons with pure control schools. The omitted year is 2018, the year before the first wave of the intervention. Standard errors are robust and clustered at the school level.

Figure 5: Distributional Estimates



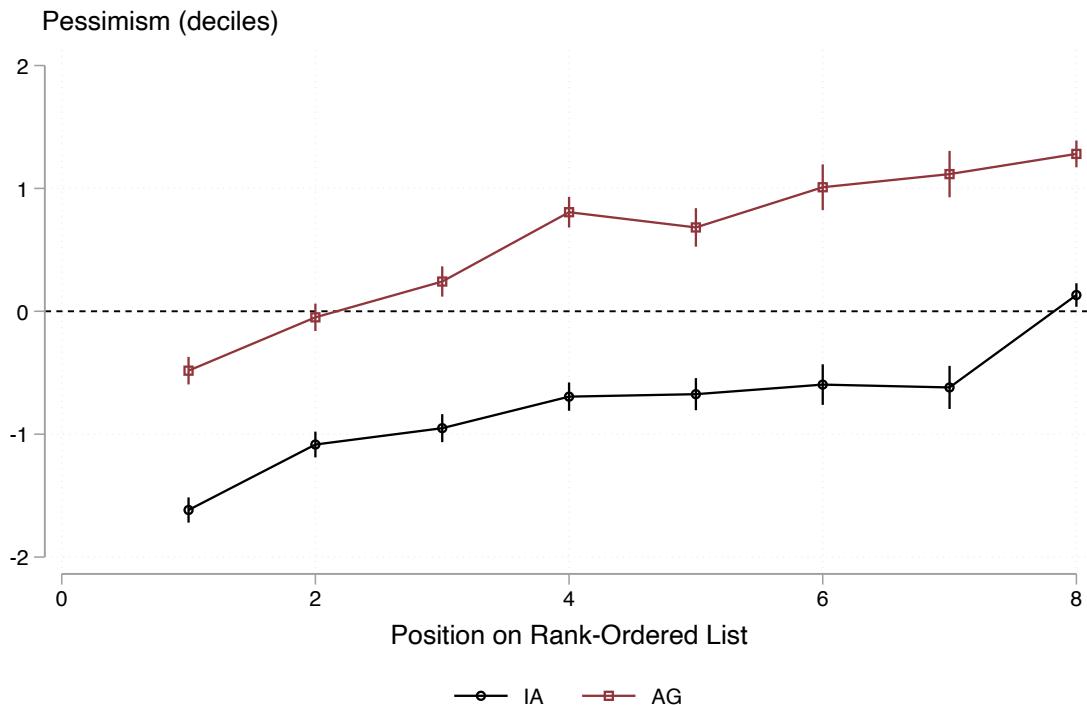
*Notes:* This figure displays distribution regression estimates across the incoming achievement (achievement growth) distribution. The sample stacks experimental waves and includes experiment-year fixed effects along with student baseline controls included in other estimates throughout the paper. Panels (a) and (b) report treatment effects from models that aggregate treatment at the treatment type level, with types corresponding to IA, AG, both, or spillover. Throughout, standard errors are clustered at the school level.

Figure 6: IA and AG Pessimism Distribution



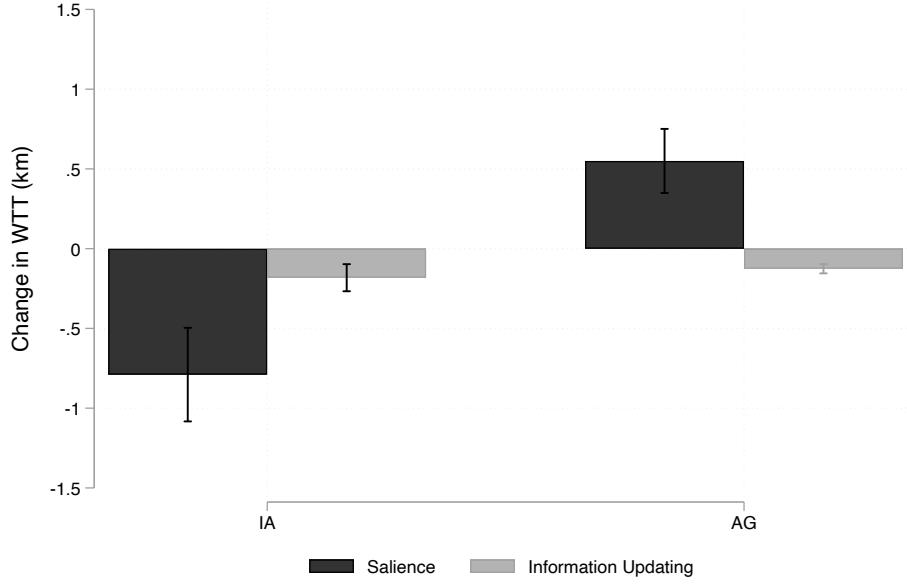
*Notes:* This figure reports the pessimism distribution for incoming achievement (IA) and achievement growth (AG). Beliefs are collected in terms of deciles, and pessimism is calculated by the difference in between the elicited belief and the estimated belief. Dashed lines correspond to mean pessimism for both quality measures.

Figure 7: Pessimism across the Rank-Ordered List

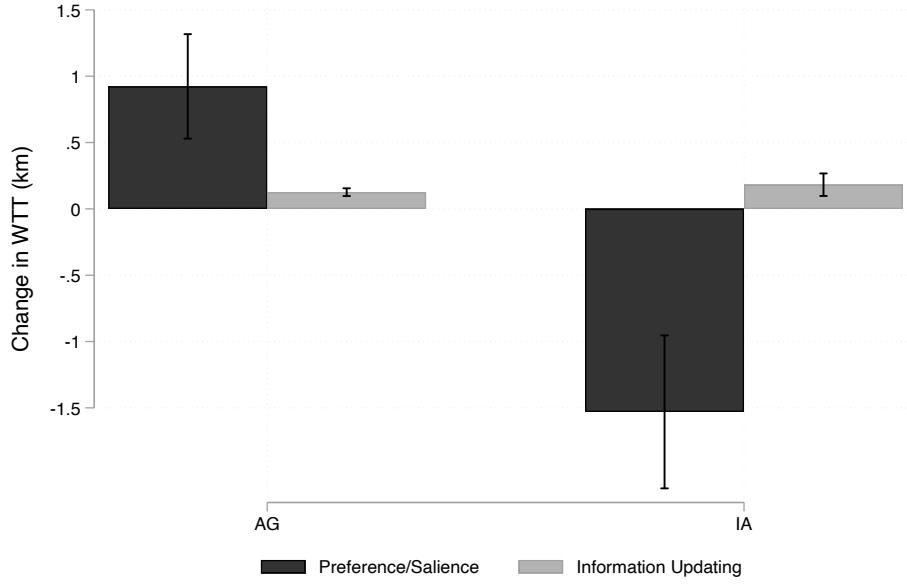


*Notes:* This figure reports mean pessimism for incoming achievement (IA) and achievement growth (AG) at various points of parents' rank-ordered lists. Points corresponds to means, and 95% confidence intervals are represented by the bars.

Figure 8: Decomposition of Utility Weight Impacts



(a) Treatment Effects



(b) Spillover Effects

*Notes:* This figure reports decomposition estimates for two separate models. Panel (a) and Panel (b) report decomposition estimates from an information-specific model, where Panel (a) reports treatment effects for directly treated parents and Panel (b) reports estimates for the spillover group. For example, in Panel A the first two bars correspond to decomposition estimates of IA weights among those receiving IA only. Similarly, the next two bars are decomposition estimates of AG weight impacts among those receiving AG only. Black bars correspond to the salience component and grey bars correspond to the information updating component. In Panel (b), the treatment status for each set of bars corresponds to the spillover group. The underlying parameters used for the decomposition, bias variances, and correlations are jointly estimated via maximum likelihood. These estimates are used in combination with control group utility weight estimates to calculate decomposition factors. Standard errors are robust, clustered at the school level, and estimated via the delta method.

Table 1: ZOC and Non-ZOC Differences

	Non-ZOC (1)	ZOC (2)	Difference (3)
Reading Scores	0.135	-0.117	-0.252 (0.081)
Math Scores	0.099	-0.114	-0.213 (0.081)
College	0.1	0.065	-0.036 (0.017)
Migrant	0.036	0.054	0.018 (0.007)
Female	0.513	0.481	-0.032 (0.016)
Poverty	0.909	0.967	0.058 (0.024)
Special Education	0.148	0.141	-0.007 (0.022)
English Learners	0.076	0.134	0.058 (0.017)
Black	0.107	0.03	-0.077 (0.027)
Hispanic	0.683	0.862	0.179 (0.075)
White	0.038	0.015	-0.024 (0.009)
N	26,517	13,015	

*Notes.* This table consists of the 2019–2020 cohort of eighth-grade students in LAUSD observed in sixth grade. Column 1 contains sample means for non-ZOC students, Column 2 contains sample means for ZOC students, and Column 3 contains the difference with a robust standard error in parentheses underneath. College is an indicator equal to one if parents self-reported being college graduates. Migrant is an indicator equal to one if a student’s birth country is not the United States. Poverty is an indicator equal to one if LAUSD flags the student as living in poverty. Reading and math test scores are normalized within grade and year.

Table 2: Difference-in-Difference Estimates on School Attributes

	(1)	(2)	(3)	(4)	(5)
	Pure Control Mean	High Saturation 2019	Low Saturation 2019	High Saturation 2021	Low Saturation 2021
Achievement Growth	65.587	4.896** (2.120)	1.033 (2.175)	8.775** (4.186)	0.097 (2.962)
Incoming Achievement	34.517	-1.540 (1.646)	-2.061 (1.774)	0.482 (2.397)	3.122 (2.313)
Female	0.487	0.003 (0.002)	-0.001 (0.002)	0.006 (0.005)	-0.001 (0.003)
Migrant	0.082	0.000 (0.001)	0.002* (0.001)	-0.002 (0.001)	-0.001 (0.002)
Poverty	0.979	0.000 (0.002)	0.003* (0.002)	0.005 (0.006)	0.002 (0.004)
Special Education	0.119	0.003** (0.001)	0.001 (0.001)	0.004 (0.004)	0.000 (0.002)
English Learner	0.146	0.002 (0.003)	0.004** (0.002)	-0.010 (0.009)	0.000 (0.005)
College	0.054	0.001 (0.002)	-0.002 (0.002)	0.002 (0.006)	0.000 (0.003)
Black	0.044	0.000 (0.002)	0.000 (0.002)	-0.014 (0.013)	-0.003 (0.004)
Hispanic	0.908	-0.002 (0.003)	0.002 (0.003)	0.008 (0.014)	0.002 (0.007)
White	0.019	0.002* (0.001)	-0.002 (0.001)	0.005 (0.004)	0.001 (0.002)
Suspension Days	12.310	-0.572 (0.605)	0.162 (0.545)	-1.485 (3.517)	-0.582 (2.832)
Suspension Incidents	0.007	0.000 (0.000)	0.000 (0.000)	-0.001 (0.001)	0.000 (0.001)

N

69,054

*Notes:* This table reports difference-in-difference estimates on row variables. These estimates come from regressions of most-preferred school attributes—either incoming achievement or achievement growth—on year and treatment group fixed effects along with treatment group indicators interacted with event-time indicators.

All estimates are identified by comparisons of changes between students at treated schools with pure control schools. Standard errors are robust and clustered at the school level.

Table 3: Heterogeneity Results

	(1)	(2)	(3)	(4)	(5)
Pure Control Mean	High Saturation 2019	Low Saturation 2019	High Saturation 2021	Low Saturation 2021	
Panel A: Incoming Achievement Percentile					
Low Achievers	33.473	-1.495 (1.415)	-1.379 (1.526)	-2.394 (2.236)	0.773 (1.712)
Moderate Low Achievers	36.511	-1.426 (1.462)	-0.305 (1.526)	0.230 (2.311)	2.128 (1.561)
Moderate High Achievers	37.433	-1.872 (1.405)	-1.961 (1.322)	0.370 (2.269)	4.531** (1.314)
High Achievers	41.040	-1.504 (1.064)	-2.028* (1.146)	-1.476 (2.597)	3.586* (2.015)
Panel B: Achievement Growth Percentile					
tex					
Low Achievers	63.906	4.864*** (1.850)	1.127 (1.471)	7.892* (4.734)	-0.976 (2.179)
Moderate Low Achievers	65.931	3.191* (1.692)	2.349 (1.575)	7.311** (3.646)	-0.627 (2.837)
Moderate High Achievers	66.698	0.789 (2.146)	-0.290 (1.814)	5.384 (3.718)	-0.413 (1.941)
High Achievers	67.619	2.647 (1.721)	0.148 (1.402)	6.593** (3.235)	2.040 (2.361)

*Notes:* Notes here

Table 4: Willingness to travel estimates

	<u>WTT Estimates</u>		P-value
	IA	AG	
<b>Treatment</b>			
Untreated	0.392*** ( 0.093)	0.658*** ( 0.078)	0.017
Information: IA	-0.972*** ( 0.174)	0.474*** ( 0.104)	0.000
Information: AG	-0.865 ( 0.171)	0.424*** ( 0.101)	0.000
Information: Both	-0.815*** ( 0.154)	0.565*** ( 0.100)	0.000
Spillover	-0.947*** ( 0.172)	0.336*** ( 0.100)	0.000
Distance		-0.068*** ( 0.006)	
P-Value	0.733	0.189	
Number of Choices		142589	
Number of Students		21774	

*Notes:* This table reports estimates from the model outlined in Equation 23. Column (1) corresponds to estimates of IA utility weights and Column (2) corresponds to estimates of AG utility weights. Rows labeled as Untreated correspond to utility weight estimates for families in the pure control group. Information:IA, Information:AG, and Information:Both correspond to directly receiving IA, AG, or Both types of information, respectively, and represent changes in estimated willingness to travel for the column attribute. Each cell, except for distance estimates, report estimates in willingness to travel units. These are calculated by dividing the unreported utility weight estimate (or impact) by the corresponding distance disutility estimate. Column (3) reports the p-value of a test of equality of estimates in Column (1) and (2) within a row. The p-value reported in the bottom rows corresponds to a test with the null hypothesis that all utility weight impacts within a given column are equal. Standard errors are reported in parentheses and estimated via the delta method.

Table 5: Effects on Cognitive and Non-Cognitive Outcomes

	(1)	(2)	(3)	(4)	(5)
	Control Mean	Low Saturation 2019	Low Saturation 2021	High Saturation 2019	High Saturation 2021
Panel A: Ninth Grade Non-Cognitive Outcomes					
Happiness Index	0.025	-0.038 ( 0.027)	-0.006 ( 0.030)	0.028 ( 0.027)	0.072** ( 0.028)
Interpersonal Skills Index	0.019	-0.060** ( 0.024)	-0.004 ( 0.021)	-0.019 ( 0.026)	0.056** ( 0.028)
School Connectedness Index	0.504	-0.014 ( 0.015)	0.000 ( 0.017)	0.004 ( 0.015)	0.039** ( 0.016)
Academic Effort Index	0.041	-0.048 ( 0.031)	-0.006 ( 0.029)	-0.002 ( 0.022)	0.046** ( 0.022)
Bullying Index	0.180	0.048 ( 0.033)	0.029 ( 0.026)	0.099*** ( 0.036)	0.094*** ( 0.028)
Observations				23,792	
Panel B: Eleventh Grade Test Scores					
Math Score	0.006	-0.039 ( 0.037)	- ( 0.040)	-0.031 ( 0.040)	- ( 0.040)
ELA Score	0.097	-0.007 ( 0.036)	- ( 0.036)	-0.001 ( 0.036)	- ( 0.036)
Observations				16,145	

*Notes:* This table reports estimates from several regressions. Each row corresponds to a separate student-level regression of the row variable on year indicators, treatment group indicators, a vector of baseline student covariates, and treatment group indicators interacted with treatment year indicators. Panel A corresponds to outcomes measured in the School Experience Survey (SES) for the 2018 cohort, 2019 cohort, and 2021 cohort. Appendix E discusses the construction of the indices in Panel A. Panel B focuses on eleventh-grade test scores and is limited to the 2018 and 2019 cohorts as test score data for the 2021 cohort are not yet available. Column (1) reports control group means for the 2018 cohort. The next four columns report treatment- and year-specific treatment effects. Columns (2) and (3) focus on treatment effects for students enrolled in low saturation schools and Columns (4) and (5) focus on effects for students enrolled in high-saturation schools. Throughout, standard errors are robust and clustered at the school level.

# ONLINE APPENDIX. Not for Publication

## A Data Appendix

### A.1 Experimental Sample

### A.2 School Experience Survey

The School Experience Survey (SES) is an annual survey administered by the Los Angeles Unified School District (LAUSD) every academic year since 2010. The survey is administered to parents, students, and staff. Response rates for students and staff are high, while response rates for parents vary substantially. For example, in the most recent academic year with available survey data, 2022-23, students had a 95% response rate, teachers had a 98% response rate, and parents had a 69% response rate. The survey has evolved over time, with questions entering and leaving the survey in some years, the formatting of questions also changing, and new categories being introduced over time. The analysis I conduct focuses on a somewhat stable part of the student survey that is less prone to changes, the sections I refer to as the core survey elements.

The core survey is organized into three categories, Academics, School Climate, and Social and Emotional Learning. The survey elements mirror data collected by Chicago Public Schools (CPS) studied by Jackson et al. (2020) and many other large urban school districts. Within the Academics category, there are subcategories related to Academic Focus, Cognitive Engagement, Future Orientation, and Technology, with the Technology subcategory being the most recent addition post-pandemic. The School Climate category consists of questions related to Safety, Expectations for Behavior, School Connectedness, and Bullying. The Social and Emotional Learning section contains questions related to Growth Mindset, Responsible Decision-Making, Self Awareness, Self-Efficacy, Self-management, and Student Social Awareness. The categorizations I reference are created by LAUSD.

In recent years, there has been growing emphasis on the importance of socio-emotional development and the potential ways teachers and schools affect these outcomes (Fricke et al., 2019, Jackson et al., 2020, Loeb et al., 2018). Jackson et al. (2020) finds that school impacts on socio-emotional measures in CPS, closely related to socio-emotional measures in the LAUSD SES, are predictive of long-run outcomes and suggestive evidence they are causal. I follow Jackson et al. (2020) in categorizing survey elements as their categorizations have closer associations to a large body of work across economics and psychology (Alan et al., 2019, Duckworth et al., 2007, Heckman and Rubinstein, 2001, Lindqvist and Vestman, 2011).

Using the wealth of data in the survey, I construct five indices that serve as outcomes in my analysis. The first four closely mirror the indices created by Jackson et al. (2020), including an interpersonal skills index, school connectedness index, academic effort index, and bullying index. The fifth is a happiness index which includes elements from the other four but is constructed to more closely isolate school satisfaction. I now report the questions related to each index.

**Interpersonal Skills Index :** This index consists of six questions. They include the following:  
During the past 30 days,

1. How often did you compliment others' accomplishments?
2. How well did you get along with students who are different from you?
3. When others disagreed with you, how respectful were you of their views?
4. How clearly were you able to describe your feelings?
5. How carefully did you listen to other people's points of view?

Please answer how often you did the following during the past 30 days,

6. I stayed calm even when others bothered or criticized me.

**School Connectedness Index:** This index consists of thirteen questions. They include the following: Do you strongly agree, agree, neither agree or disagree, somewhat disagree, or strongly disagree with the following statements:

1. I am happy to be at this school.
2. I feel like I am part of this school.
3. I feel close to people at this school.
4. The teachers at this school treat students fairly.
5. Teachers care if I am absent from school.
6. I feel accepted for who I am at this school.
7. Adults at this school treat all students with respect.
8. I feel safe in this school.
9. I feel safe in the neighborhood around this school.
10. Lesbian, gay, bisexual, transgender, and/or queer students at this school are accepted.
11. Teachers encourage students to make decisions.
12. There are lots of chances for students at my school to get involved in sports, clubs, or other school activities outside of class.
13. I participate in extra-curricular activities offered through my school, such as school clubs or organizations, musical groups, sports teams, student government, or any other activities.

**Academic Effort Index:** This index consists of ten questions. They include the following:  
During the past 30 days,

1. I came to class prepared.
2. I remembered and followed directions.
3. I got my work done right away instead of waiting until the last minute.
4. I paid attention even when there were distractions.

Do you strongly agree, agree, neither agree or disagree, somewhat disagree, or strongly disagree with the following statements:

5. School is important for achieving my future goals.
6. When learning new information, I try to put the ideas into my own words.
7. In my classes, I use evidence or collect data to come to my own conclusions.
8. In my classes, I work on projects or assignments with other students.
9. For my assignments, I explain my thinking in writing.
10. In my classes, I think about how to solve problems in new ways.

**Bullying Index:** This index consists of eight questions. They include the following: During the past 30 days,

1. How many times on school property have you had mean rumors or lies spread about you?
2. How many times on school property have you been teased about what your body looks like?
3. How many times on school property have you been made fun of because of your looks or the way you talk?
4. How many times on school property have you been pushed, shoved, slapped, hit, or kicked by someone who wasn't just kidding around?
5. How many times on school property have you had sexual jokes, comments, or gestures made at you?
6. How many times have other students from your school bullied you online?

Do you strongly agree, agree, neither agree or disagree, somewhat disagree, or strongly disagree with the following statements:

7. Kids at this school are kind to each other.
8. If I told a teacher or other adult at this school that another student was bullying me, he or she would try to help me.

**Grit Index:** This index consists of eight questions. They include the following: Do you strongly agree, agree, neither agree or disagree, somewhat disagree, or strongly disagree with the following statements:

1. I can change my intelligence with hard work.
2. I can increase my intelligence by challenging myself.
3. I am capable of learning anything.
4. I can do well in a subject even if I am not naturally good at it.
5. I can earn high marks/grades in my classes.
6. I can do well on all my tests, even when they're difficult.
7. I can master the hardest topics in my classes.
8. I can meet all the learning goals my teachers set.

## B Model Details

### B.1 Single Attribute Model

The starting point for the decomposition discussed in Section 3 is a discrete choice model with perfect information. To simplify exposition, let's assume we are interested in the impacts of information on a single attribute. In a model with perfect information, we can summarize the intervention's effects with a change in families' utility weights. The indirect utility of student  $i$  enrolling in school  $j$  is

$$U_{ij} = \gamma X_j + \beta X_j \times T_i - \lambda d_{ij} + \varepsilon_{ij}$$

where  $T_i$  corresponds to a treatment indicator,  $X_j$  is the attribute of school  $j$ ,  $d_{ij}$  is distance to school  $j$ , and  $\varepsilon_{ij}$  is any remaining unobserved preference heterogeneity. The willingness to travel for the control group is

$$WTT_0 = \frac{\gamma}{\lambda},$$

and the willingness to travel for the treatment group is

$$WTT_1 = \frac{\gamma + \beta}{\lambda},$$

so that the change in the willingness to travel induced by the information is

$$\Delta WTT = \frac{\beta}{\lambda}.$$

In a model with perfect information, the change in the willingness to travel only comes from families re-prioritizing the importance of  $X_j$  after receiving information. One can interpret this as a change in their preferences or what I refer to as a salience effect.

In a model with imperfect information, families that receive information make decisions using the information they received and families without information make decisions using their beliefs. Beliefs are modeled as proportional shifts away from their true value, with shifts varying at the individual and school level:

$$\tilde{X}_{ji} = (1 + b_i)X_j$$

In this model, families in the control group effectively assign weight  $\tilde{\gamma}_i = \gamma(1 + b_i)$  to each  $X_j$ , so that the underlying indirect utility model is

$$U_{ij} = \tilde{\gamma}_i X_j + \tilde{\beta}_i X_j \times T_i - \lambda d_{ij} + \varepsilon_{ij}.$$

The parameterization above allows for different groups to have different willingness to travel for attribute  $X$ . In particular, the average willingness to travel for the two groups are

$$E[WTT_{i0}] = \frac{\gamma(1 + \mu_X)}{\lambda} \quad (10)$$

$$E[WTT_{i1}] = \frac{\gamma + \beta}{\lambda}, \quad (11)$$

so that the average change in the willingness to travel induced by the information is

$$\Delta \tilde{WTT} = \frac{\beta - \gamma \mu_X}{\lambda}.$$

Because researchers estimate models using  $X_j$ , this means that the average change in willingness to travel estimates nest both the salience effect and the information effect. With survey data, one can pin down the portion of the mean change due to information and the residual is allocated to salience or corresponds to the actual change in willingness to travel.

## B.2 Multiple Attribute Model

The multiple attribute extension is similar to the single attribute model, but also considers how information about only one attribute can potentially influence beliefs and salience about another attribute. Families make decisions using their beliefs about  $X_{1j}$  and  $X_{2j}$ . One way to model beliefs is to allow families to have idiosyncratic quality-specific biases,  $\tilde{X}_{1ji} = (1 + b_{1i})X_{1j}$  and  $\tilde{X}_{2ji} = (1 + b_{2i})Q_{2j}$ . I assume that beliefs are jointly normal,

$$\begin{pmatrix} b_{1i} \\ b_{2i} \end{pmatrix} \sim \mathcal{N}\left(\begin{pmatrix} \mu_1 \\ \mu_2 \end{pmatrix}, \begin{pmatrix} \sigma_1^2 & \rho\sigma_1\sigma_2 \\ \rho\sigma_1\sigma_2 & \sigma_2^2 \end{pmatrix}\right),$$

with  $\rho$  governing the correlation of biases and  $\sigma_1$  and  $\sigma_2$  the respective standard deviations.

In a setting with this structure, indirect utility of student  $i$  enrolling in school  $j$  is

$$U_{ij} = \gamma_{i1} X_{1j} + \gamma_{i2} X_{2j} + \sum_{t \in \{1, 2, B\}} \sum_{k \in \{1, 2\}} \beta_{ikt} X_{kj} \times T_{it} - \lambda d_{ij} + \varepsilon_{ij}$$

where  $T_{it}$  is an indicator equal to one if individual  $i$  is in treatment group  $t$  and the  $\beta_{kt}$  correspond to changes in utility weights for attribute  $k$  among those in treatment group  $t$ .

The willingness to travel for the attributes now depends on the different treatment statuses. A key difference from the single attribute model is that information about one attribute affects beliefs about another through a correlated beliefs channel. An important assumption made in this decomposition is a perfect compliance assumption, meaning that individuals receiving information about attribute  $X$  update so that their  $b_{iX} = 0$ . The willingness to travel estimands

are the following:

$$E[WTT_{i10}] = \frac{\gamma(1 + \mu_1)}{\lambda} \quad (12)$$

$$E[WTT_{i11}] \equiv E[WTT_{i11}|b_{i1} = 0] = \frac{\gamma + \beta_{11}}{\lambda} \quad (13)$$

$$E[WTT_{i12}] \equiv E[WTT_{i12}|b_{i2} = 0] = \frac{\gamma(1 + \mu_1 - \rho \frac{\sigma_1}{\sigma_2} \mu_2)}{\lambda} + \frac{\beta_{12}(1 + \mu_1 - \rho \frac{\sigma_1}{\sigma_2} \mu_2)}{\lambda} \quad (14)$$

$$E[WTT_{i1B}] \equiv E[WTT_{i1B}|b_{i1} = 0, b_{i2} = 0] = \frac{\gamma + \beta_{1B}}{\lambda}. \quad (15)$$

As before, the experimental assignment helps identify changes in willingness to travel induced by the information intervention. The results from the single attribute model translate to the multiple attribute model, but it is worth discussing how correlated beliefs about quality influence the effects of information about one attribute on preferences for other attributes. Continuing from the leading example above, individuals assigned treatment 2 may exhibit a change in their willingness to travel for attribute 1. The change in willingness to travel will nest several factors governed by the degree of imperfect information in the population. The change in the average willingness to travel for this group is

$$E[\Delta WTT_{i12}] = \frac{\beta_{12}(1 + \mu_1)}{\lambda} - \frac{(\gamma + \beta_{12})\rho \frac{\sigma_1}{\sigma_2} \mu_2}{\lambda}. \quad (16)$$

The expression is intuitive and has two countervailing forces. If the information about attribute 2 induces a salience effect for attribute 1 due to a reprioritization of the importance of each, this is captured by  $\beta_{12}$  which is amplified by the degree of bias in the population at baseline,  $\mu_1$ . This effect is potentially offset by the correlated nature of beliefs. In particular, if beliefs are positively correlated and families overestimate school quality, then the second term offsets the amplification in the first term. Overall, the factors influencing the effects of one attribute on another depend on the presence of salience effects and the degree of imperfect information at baseline. In the case with perfect information, the average change in willingness to travel is only due to salience. In the core of the paper, I only report decomposition estimates for the primary effects of interest.

## C Survey Details

In this section, I report the survey instrument used in the paper and details about a pilot regarding messaging strategies. In Section F, I report additional survey evidence alluded to in the main paper.

The additional survey evidence is categorized into four topics. The first corresponds to the attributes of survey respondents (see Table F.1). The second is additional survey evidence not reported in the main paper (see Table F.2 and Figure F.1). The third corresponds to descriptive evidence about belief correlates, including both student-level attributes and researcher-generated measures of quality (see Table F.3-F.5 and Figure F.2). Section F.0.1 reports evidence comparing preference estimates using researcher-generated measures of quality and elicited beliefs in spirit of Ainsworth et al. (2023) (see Table F.6).

### C.1 Survey Questions

The survey has a total of 10 questions and in piloting took roughly 5-8 minutes to complete. The questions are reported below.

**Section A - The following questions are useful to help the district better communicate the program to families.**

1. What is your relationship to the student?

- Father
- Mother
- Grandparent
- Guardian

2. Has anyone mentioned the Zones of choice to you before?

- Yes
- No

**Section B - The following questions are to assess your planned participation in the application cycle and for us to learn what to emphasize in future years.**

3. How many hours do you anticipate spending researching schools?

- Less than 2 hours
- 2-5 hours
- 6-10 hours
- 11-15 hours
- More than 15 hours

4. Do you anticipate doing any of the following? (check all that apply)

- Visit school fair
- Watch school promotional videos
- Online research
- Talk to teachers
- Talk to other parents
- Consider your student's input

5. Rank the following school characteristics in terms of importance (1-7), where 1 is the most important

- Test score improvement
- Performance of other students
- Safety
- Reputation of teachers
- Distance from home
- Available sport offerings

6. How important are a school's students when choosing a school?

- Not important
- Somewhat important
- Important
- Very important

7. How important are a school's test scores when choosing a school?

- Not important
- Somewhat important
- Important
- Very important

8. Do you think schools that attract the highest performing students are also the most effective at facilitating test score growth?

- Yes, definitely
- Not necessarily

## C.2 Pilot Details

Months before the intervention, I piloted various messaging strategies on Amazon Mechanical Turk (mTurk). I provided respondents with brief descriptions about each quality measure and then asked them to answer questions that allowed me to infer two things: (i) whether or not they were paying attention and (ii) their level of understanding. To detect inattention, I presented respondents with hypothetical questions that asked them to infer what peer and school quality were like with the available information. In these questions, either incoming achievement (IA) or achievement growth (AG) were held constant, and the respondent had to infer differences between hypothetical schools based on the other measure. To probe at their level of understanding, I asked them to provide a description of the difference between the two measures. Independent researchers subsequently subjectively evaluated the responses.

Given the selected nature of mTurk participants, I imposed a few restrictions on who could respond and to more closely mirror ZOC families. Respondents were restricted to be parents, be under the age of 60, and have at most a high school degree. Too few Hispanic respondents participated at the times I issued the survey to hold that attribute constant across respondents.

Table C.1 presents the results. Roughly 90% of participants could correctly infer IA and AG. Hispanic respondents responded correctly at a modestly lower rate that was statistically insignificant. For respondents' written responses, around 70% wrote something that indicated they understood the difference between IA and AG. In contrast to the other questions, Hispanic respondents wrote correct responses at a modestly higher rate that was also statistically insignificant. Other pilots were run on samples that were not restricted to high school graduates, and I observed higher averages.

Table C.1: MTurk Piloting Results

	Non-Hispanic (1)	Hispanic (2)	Difference (3)
Incoming Achievement	0.926	0.833 (0.058)	-0.092
Achievement Growth	0.946	0.917 (0.044)	-0.029
Both	0.892	0.792 (0.064)	-0.101
Understood	0.671	0.687 (0.078)	0.0163
Time to Completion	290	320	30.1 27.8
N	149	48	

Notes. Incoming achievement results come from a question holding achievement growth constant for two hypothetical schools and asking respondents which school had the highest incoming achievement. Achievement growth results similarly come from a question holding incoming achievement constant and asking respondents to infer hypothetical schools' achievement growth. Both corresponds to respondents who got both questions right. Understood presents results from a subjective evaluation of responses explaining the difference between achievement growth and incoming achievement. Time to completion corresponds to response times (in seconds)

**Section C - We are going to ask you questions about your preferences and beliefs about two important characteristics of schools. We determine the quality of a school based on students' average scores on state exams.**

This measure has two parts you should consider: One (1) which measures the school's ability of attracting high scoring students, and the second (2) is the school's impact on test score growth.

- Incoming Achievement (IA): We can measure a school's ability to attract high-achieving students by measuring the average test scores of its incoming students.
  - Achievement Growth (AG): Similarly, we can measure the school's ability to improve test scores using the growth of the same student's test scores between entry into the school and some later date.
9. For the next table, please give each school a rating between 0-10, 10-20, ..., 90-100 according to your beliefs about their ability in terms of (1) Incoming Achievement and (2) Achievement Growth.

10. Please rank the schools as if you were submitting the application today. Note there are  $K$  schools you can choose from, so rank your most preferred as 1 and the least preferred as  $K$ .

## D Peer and School Quality Estimation

In this section, we discuss the peer and school quality estimation. We consider a constant-effects value-added model (Angrist et al., 2017). In particular, potential outcomes are denoted as

$$Y_{ij} = \mu_j + a_i \quad (17)$$

where  $\alpha_j$  is the mean potential outcome at school  $j$  and  $a_i$  is student ability. We denote school  $j$  enrollment indicators as  $D_{ij}$ , so that we can write the observed outcome  $Y_i$  as

$$Y_i = \mu_0 + \sum_j \beta_j D_{ij} + a_i.$$

We further assume that  $a_i = \gamma' X_i + u_i$ , where  $X_i$  is a vector of student baseline covariates including lagged test scores. With this assumption, the observed outcome is

$$Y_i = \mu_0 + \sum_j \beta_j D_{ij} + \gamma' X_i + u_i \quad (18)$$

which is the canonical causal value-added model considered in the literature (Campos and Kearns, 2023).

In estimation, however, a regression of observed outcomes on school indicators and the vector of student covariates is

$$Y_i = \alpha_0 + \sum_j \alpha_j D_{ij} + \theta' X_i + e_i$$

and  $e_i$  need not be uncorrelated with  $D_{ij}$ , and  $\alpha_j \neq \beta_j$ .

Although we estimate school quality using the standard selection on observables assumption, we leverage the lottery variation embedded in the Zones of Choice markets to assess for bias in the school quality estimates (Angrist et al., 2017). With forecast unbiased estimates, we then proceed to construct our measures of school and peer quality.

### D.1 VAM Validation

We use the procedure outlined by Angrist et al. (2017) to test for bias in the VAM estimates. We can construct predictions using the value-added model we estimate, which we denote as  $\hat{A}_i$ . To test for bias, we treat  $\hat{A}_i$  as an endogenous variable in a two-stage least squares framework using  $L$  lottery offer dummies  $Z_{i\ell}$  that we collect across zones and cohorts:

$$A_i = \xi + \phi \hat{A}_i + \sum_\ell \kappa_\ell Z_{i\ell} + \mathbf{X}'_i \delta + \varepsilon_i \quad (19)$$

$$\hat{A}_i = \psi + \sum_{\ell} \pi_{\ell} Z_{i\ell} + \mathbf{X}'_i \xi + e_i. \quad (20)$$

If lotteries shift VAM predictions in proportion to the shift of realized test scores  $A_i$ , on average, then  $\phi = 1$ , which is a test of forecast bias (Chetty et al., 2014, Deming, 2014). The overidentifying restrictions further allow us to test whether this applies to each lottery and thus to test the predictive validity of each lottery.

Table D.1 reports results for two value-added models. Column 1 reports results for a model that omits any additional covariates beyond school-by-year dummies; this is the uncontrolled model. As discussed in Deming et al. (2014), Chetty et al. (2014), and Angrist et al. (2017), models that do not adjust for lagged achievement tend to perform poorly in their average predictive validity. Indeed, we find the forecast coefficient to be 0.63, indicating that the uncontrolled model does not pass the first test. Column 2 reports estimates from a constant effects VAM specification and demonstrates that our VAM estimates are forecast unbiased and the overidentification tests provide reassuring evidence regarding the predictive validity of each VAM estimate. While the results in Table D.1 do not entirely rule out bias in OLS value-added estimates, they are reassuring.

Table D.1: Forecast Bias and Overidentification Tests

	(1)	(2)
	Uncontrolled	Constant Effect
Forecast Coefficient	.63 (.105) [0]	1.111 (.134) [.41]
First-Stage F	277.507	37.016
Bias Tests:		
Forecast Bias (1 d.f.)	12.528 [0]	.683 [.409]
Overidentification (180 d.f.)	172.281 [.647]	187.744 [.331]

*Notes:* This table reports the results of lottery-based tests for bias in estimates of school effectiveness. The sample is restricted to students in the baseline sample who applied to an oversubscribed school within a school choice zone. Column (1) measures school effectiveness as the school mean outcome, Column (2) uses time-invariant value-added estimates. The forecast coefficients and overidentification tests reported in Columns (1)–(2) come from two-stage least squares regressions of test scores on OLS-fitted values estimated separately, instrumenting OLS-fitted values with school-cohort-specific lottery offer indicators, controlling for baseline characteristics.

## D.2 School and Peer Quality Measures

School average achievement follows from Equation 18

$$\bar{Y}_j = \alpha_j + \theta' \bar{X}_j$$

School quality is therefore defined as  $\hat{\alpha}_j$  and peer quality is defined as  $\hat{\theta}' \bar{X}_j$ . We convert these measures to percentile ranks in terms of the LAUSD high school distribution. In particular,

$$Q_j^S = \text{int}\left(\frac{\text{rank}(\hat{\alpha}_j)}{J} \times 100\right) \quad (21)$$

$$Q_j^P = \text{int}\left(\frac{\text{rank}(\hat{\theta}' \bar{X}_j)}{J} \times 100\right) \quad (22)$$

where  $Q_j^S$  and  $Q_j^P$  are school and peer quality, respectively, measured in percentile ranks, rounded to the nearest integer.

### D.3 Peer Effects

In this section, I briefly assess the potential influence of peer effects. The constant effects model does not explicitly model peer effects or the influence of the student body on school quality. An extreme case would have peer effects entirely mediate value-added estimates, so in this section, I explore that potential with observables.

A linear-in-means model would suggest school quality is

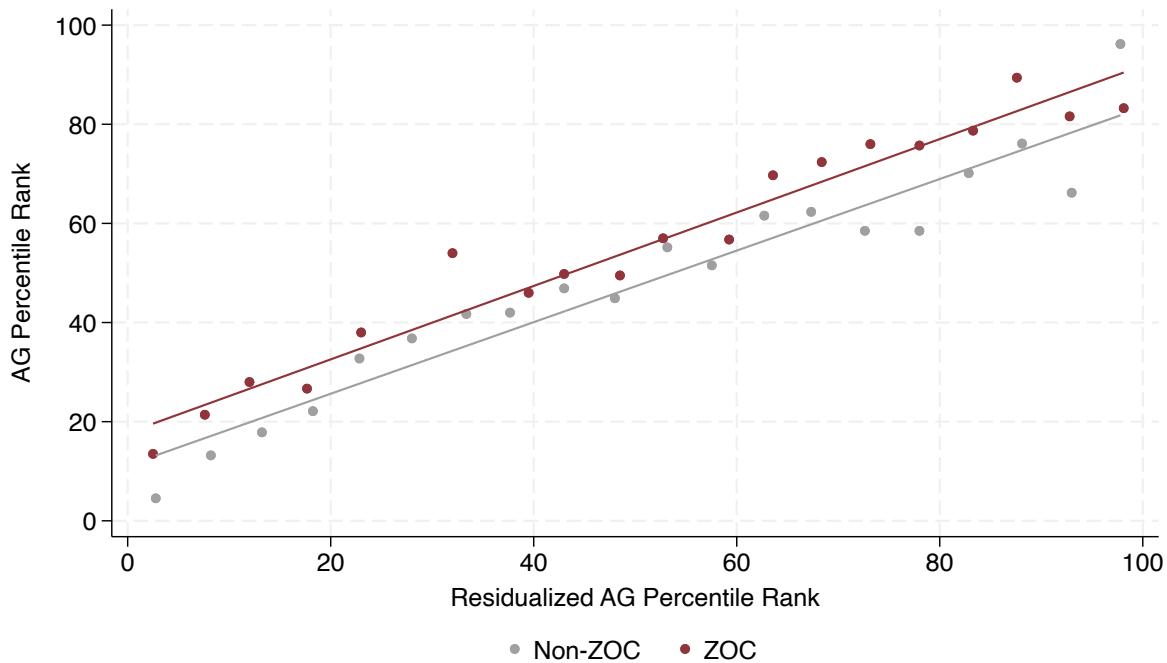
$$\alpha_j^* = \alpha_j + \delta \bar{X}_j.$$

We can assess this possibility by relating estimated values of  $\alpha_j^*$  to  $\bar{X}_j$ . Appendix Table D.2 demonstrates that estimated school quality is unrelated to essentially all of the observables in the data. In particular, lagged achievement is not a strong predictor of school quality both unconditionally and conditional on other observables. Evidence notwithstanding, one may still have chosen to regression adjust school quality estimates to remove the influence of student attributes. Appendix Figure D.1 shows that doing so produces minimal changes in the ordinal ranking of schools and, as a consequence, would have minimally affected the information contained in treatment letters. The evidence in this section suggests peer effects do not play a significant role in mediating school quality estimates.

Table D.2: Relationship between  $\alpha_j$  and student observables

	(1)	(2)	(3)	(4)
	$\alpha_j$	$\alpha_j$	$\alpha_j$	$\alpha_j$
Poverty Share		0.457 (0.326)	0.534 (0.355)	
Black Share		-0.625* (0.365)	-0.617 (0.385)	
White Share		-0.511 (0.516)	-0.425 (0.563)	
College Share		0.464 (0.918)	0.307 (0.940)	
English Learner Share		-0.408 (0.365)	-0.349 (0.403)	
English at Home Share		0.155 (0.337)	-0.0106 (0.377)	
Spanish at Home Share		0.242 (0.249)	0.0917 (0.291)	
Special Education Share		0.244 (0.412)	0.309 (0.399)	
Female Share		0.0375 (0.139)	0.0584 (0.137)	
Migrant Share		0.289 (0.336)	0.212 (0.362)	
Lagged ELA Achievement	0.0531 (0.0472)		0.0231 (0.0841)	
School Enrollment		0.000289 (0.000414)	0.000441 (0.000338)	
R-squared	0.011	0.010	0.156	0.176

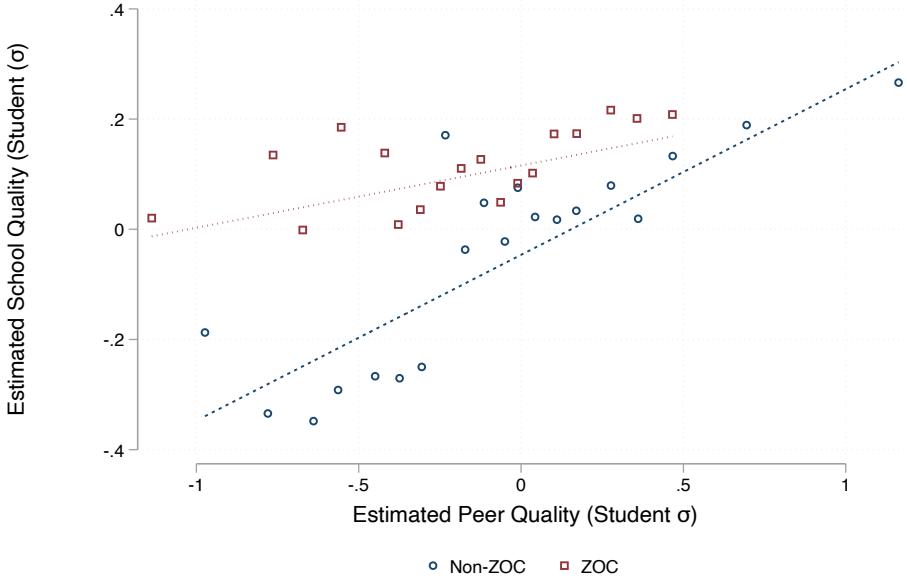
Figure D.1: Rank-rank Correlation Between Estimated School Quality and Regression-Adjusted School Quality



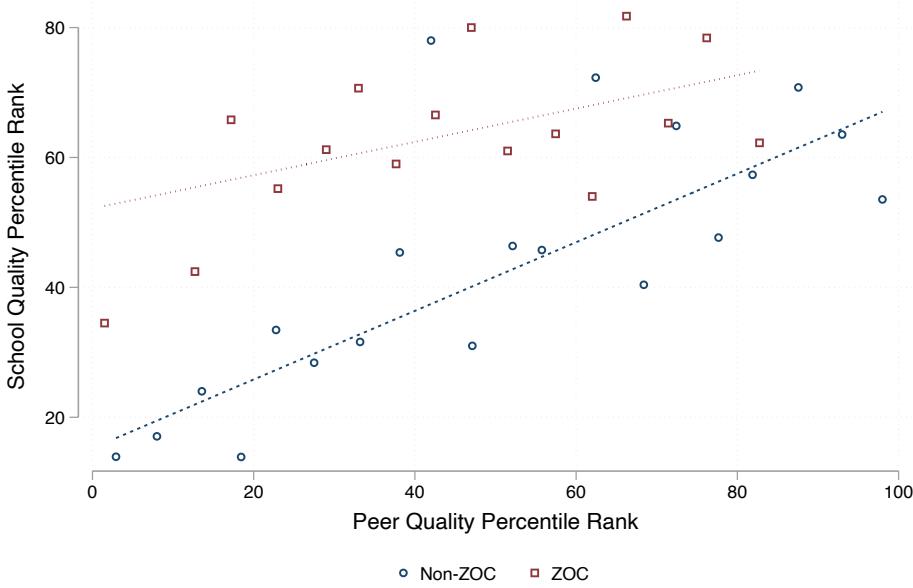


## D.4 Summary Statistics

Figure D.2: AG-IA Bivariate Relationship



(a) Student Standard Deviation Units



(b) Percentile Rank Units

*Notes:* This figure reports bivariate-binned scatter plots of the AG-IA relationship. Panel (a) reports the relationship of AG and IA in student standard deviation units. AG, also referred to as value-added, is demeaned with respect to the mean in the district, so it reflects the average treatment effect of enrolling in a given school. IA, also referred to as incoming achievement, is fraction of test scores predicted by baseline covariates. Panel (b) reports the IA-AG relationship in terms of percentile ranks defined above.

Table E.1: School Experience Survey AG-IA Correlates

	Univariate (1)	Multivariate (2)
Incoming Achievement (student $\sigma$ )		
Bullying Index	1.30*** ( 0.23)	1.26*** ( 0.32)
Connectedness Index	1.08*** ( 0.34)	0.65 ( 0.64)
Effort Index	0.74*** ( 0.24)	0.05 ( 0.59)
Interpersonal Index	0.46* ( 0.24)	0.14 ( 0.43)
Achievement Growth (student $\sigma$ )		
Bullying Index	0.95*** ( 0.10)	0.78*** ( 0.14)
Connectedness Index	0.89*** ( 0.23)	1.14*** ( 0.43)
Effort Index	0.56*** ( 0.14)	0.27 ( 0.19)
Interpersonal Index	0.21 ( 0.18)	-0.56 ( 0.35)
N		280

## E School Experience Survey

## F Additional Survey Evidence

Table F.1: Survey Respondent Characteristics

	(1)	(2)	(3)
	No Survey	Partial	Complete
Reading Z-Score	-0.199 (0.032)	0.011 (0.025)	0.151*** (0.025)
Math Z-Score	-0.187 (0.044)	0.010 (0.022)	0.162*** (0.022)
Female	0.495 (0.013)	-0.011 (0.009)	-0.018** (0.009)
Migrant	0.002 (0.002)	0.002 (0.001)	0.000 (0.001)
Poverty	0.901 (0.009)	0.004 (0.008)	-0.012 (0.008)
Special Education	0.144 (0.010)	0.012 (0.008)	-0.008 (0.008)
English Learner	0.179 (0.009)	0.009 (0.008)	-0.028*** (0.008)
College	0.081 (0.010)	-0.010 (0.010)	0.023** (0.010)
Black	0.032 (0.003)	-0.010*** (0.002)	0.000 (0.002)
Hispanic	0.911 (0.009)	-0.001 (0.010)	-0.017* (0.010)
White	0.016 (0.003)	0.001 (0.002)	0.001 (0.002)
N	5,154	1,355	4,132

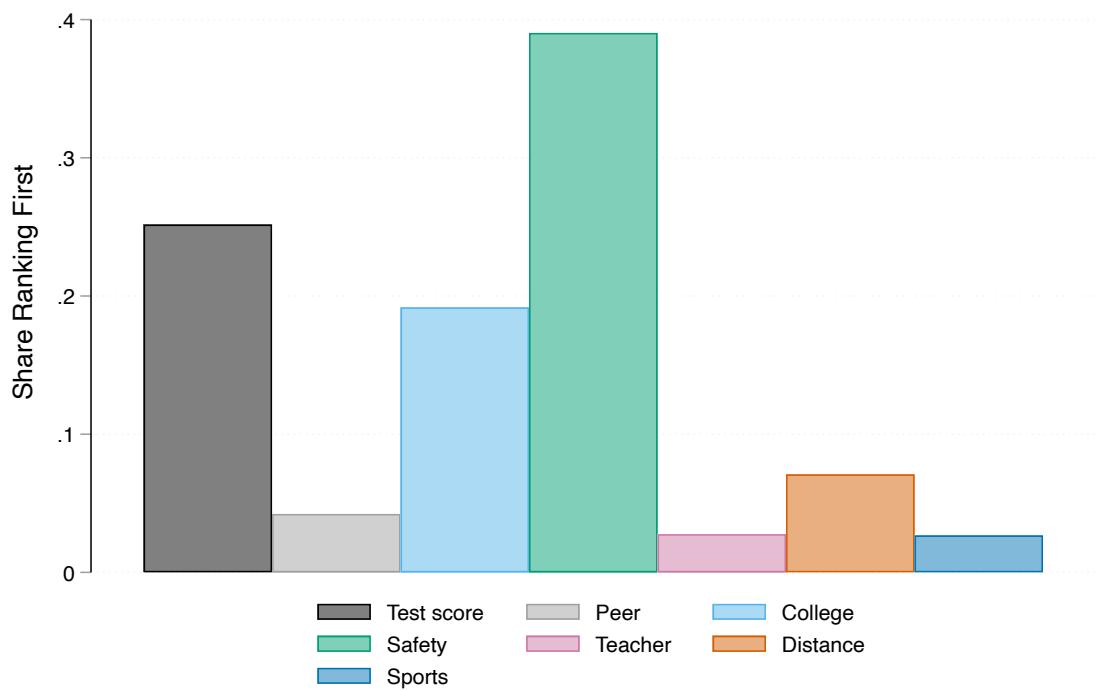
*Notes:* This table reports estimates from regressions of each row variable on indicators for survey completion status. Partial indicates that the respondent did not finish the survey, usually corresponding to missing beliefs information, and complete corresponds to respondents who completed the survey. The response rate is 51.5%, and the completion rate is 38%. Robust standard errors are reported in parentheses.

Table F.2: Survey Responses

Panel A: Anticipated Participation in the School Choice Process					
Respondent Relationship Anticipated Research Hours	Father: 0.109 Less Than 2 Hours: 0.373	Mother: 0.866 2-5 Hours: 0.352	Grandparent: 0.006 6-10 Hours: 0.352	Legal Guardians: 0.019 10+ Hours: 0.156	
Yes			No		
Have you heard of ZOC?			0.660		
Do you anticipate doing any of the following:					
Visit a school fair	0.470				0.530
Watch promotional videos	0.430				0.570
Talk to teachers	0.520				0.480
Talk to parents	0.470				0.530
Online research	0.640				0.360
Panel B: Perception of school characteristics					
Peer importance	Not Important 0.080	Somewhat Important 0.224	Important 0.224	Very Important 0.326	0.370
Test score importance	0.013	0.079	0.369	0.539	0.539
Do you think that...		Yes, definitely		Not necessarily	
Good peers imply high growth?	0.320			0.680	

Notes: This table reports a series of descriptive statistics from the baseline survey. The questions correspond to Section A and Section B of the baseline survey discussed in Appendix C.

Figure F.1: Stated Preferences over School Attributes



*Notes:* This figure reports survey item results from a question asking parents to rank various school attributes from most important (1) to least important (7). Each bar corresponds to the share of parents ranking the attribute first. The precise question is listed in Appendix Section C.

Table F.3: IA and AG Pessimism Correlation with Student Characteristics for Top-Ranked School

	IA Pessimism		AG Pessimism	
	(1)	(2)	(3)	(4)
	Bivariate	Multivariate	Bivariate	Multivariate
Parents College +	1.085 *** (0.179)	0.627 *** (0.197)	-0.009 (0.197)	0.126 (0.220)
Hispanic	-0.883 *** (0.178)	-0.243 (0.196)	0.844 *** (0.258)	1.045 *** (0.288)
English Learner	-0.365 ** (0.152)	-0.146 (0.167)	-0.064 (0.189)	-0.247 (0.210)
Special Education	0.202 (0.157)	0.354 * (0.171)	0.202 (0.182)	0.211 (0.201)
Black	0.723 ** (0.323)	0.499 (0.359)	-0.882 ** (0.437)	0.288 (0.490)
White	0.924 ** (0.410)	0.279 (0.449)	-0.024 (0.525)	0.781 (0.584)
Female	-0.091 (0.107)	-0.141 (0.118)	-0.094 (0.114)	-0.091 (0.127)
Poverty	-1.708 *** (0.171)	-1.572 *** (0.190)	0.086 (0.197)	-0.154 (0.220)
Math Z-Score	0.161 *** (0.060)	-0.043 (0.066)	-0.040 (0.098)	-0.043 (0.110)
Reading Z-Score	0.194 *** (0.061)	0.158 (0.067)	-0.026 (0.102)	0.010 (0.114)
Migrant	-1.265 (1.026)	-1.019 (1.123)	-1.484 (1.006)	-1.533 (1.118)
Mean	-1.63		-0.52	
SD	3.07		3.36	

*Notes:* This table reports univariate and multivariate correlations between student-level IA and AG pessimism measures and student-level covariates. Column 1 and Column 2 consider IA pessimism and Column 3 and Column 4 consider AG pessimism. Odd-numbered columns consider bivariate regressions of the pessimism measure on the row variable, and even-numbered columns report estimates from the multivariate analog. Robust standard errors are reported in parentheses.

Table F.4: IA and AG Absolute Bias Correlation with Student Characteristics - All Options

Bias Measure	IA		AG	
	Bivariate	Multivariate	Bivariate	Multivariate
Parent College	-0.678 *** ( 0.113)	-0.633 *** ( 0.127)	-0.035 ( 0.051)	-0.095 * ( 0.056)
Hispanic	0.221 * ( 0.113)	-0.443 *** ( 0.127)	-0.300 ** ( 0.069)	-0.262 *** ( 0.076)
English Learner	0.319 *** ( 0.096)	0.227 *** ( 0.108)	0.231 ** ( 0.047)	0.174 *** ( 0.051)
Special Education	0.061 ( 0.099)	-0.177 *** ( 0.111)	0.236 ** ( 0.045)	-0.023 ( 0.049)
Black	-0.202 ( 0.204)	-0.777 *** ( 0.232)	0.549 ** ( 0.122)	0.155 ( 0.135)
White	-0.061 ( 0.260)	-0.041 ( 0.290)	0.385 ( 0.146)	0.141 ( 0.160)
Female	-0.044 ( 0.068)	-0.017 ( 0.076)	0.044 ( 0.028)	0.022 ( 0.031)
Poverty	0.501 *** ( 0.109)	0.193 *** ( 0.123)	-0.094 ( 0.052)	-0.190 *** ( 0.057)
Math Z-Score	-0.151 *** ( 0.038)	-0.066 *** ( 0.043)	-0.182 *** ( 0.024)	-0.296 *** ( 0.027)
ELA Z-Score	-0.168 *** ( 0.039)	-0.129 *** ( 0.043)	-0.119 *** ( 0.025)	0.125 *** ( 0.028)
Migrant	0.004 ( 0.649)	-0.233 ( 0.724)	0.045 ( 0.242)	-0.177 ( 0.265)

*Notes:* This table reports univariate and multivariate correlations between student-level IA and AG absolute bias measures and student-level covariates across all options on the rank-ordered list. In contrast to pessimism, we consider absolute bias for these correlations. Column 1 and Column 2 consider IA bias and Column 3 and Column 4 consider AG bias. Odd-numbered columns consider bivariate regressions of the absolute bias measure on the row variable, and even-numbered columns report estimates from the multivariate analog. Robust standard errors are reported in parentheses.

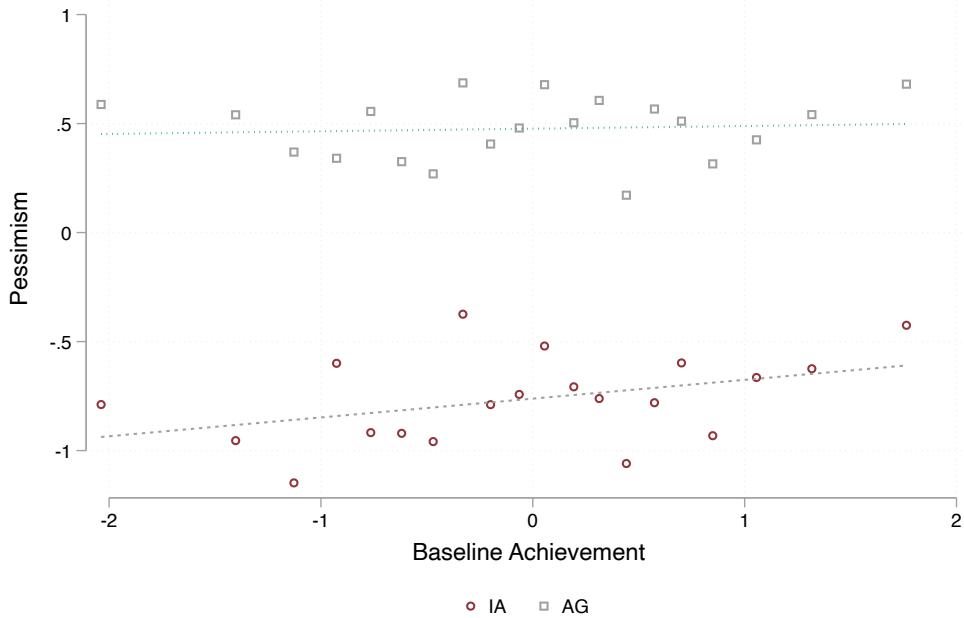
Table F.5: Pessimism Summary Statistics by Zone

	(1)	(2)	(3)
	IA	AG	N
Boyle Heights	-2.18 [3.42]	-0.09 [2.51]	697
Bell	-0.26 [2.86]	-0.26 [3.25]	5,181
Belmont	-0.88 [3.22]	0.27 [3.64]	10,283
Bernstein	-1.65 [3.46]	1.31 [3.14]	417
Carson	1.02 [2.69]	-1.47 [3.16]	1,963
Eastside	-2.09 [2.85]	1.91 [3.3]	5,439
Fremont	-1.99 [3.02]	-0.17 [3.71]	4,348
Huntington Park	-0.35 [3.09]	1.75 [2.65]	1,995
Jefferson	-1.45 [3.1]	-0.03 [3.86]	2,979
North Valley	-0.56 [2.73]	0.15 [3.4]	4,055
Narbonne	0.12 [2.78]	-3.32 [3.06]	773
Northeast	-1.1 [3.56]	-0.75 [2.72]	1,677
RFK	-3 [2.78]	0.07 [2.7]	987
South Gate	0.85 [2.76]	2.06 [2.72]	6,843

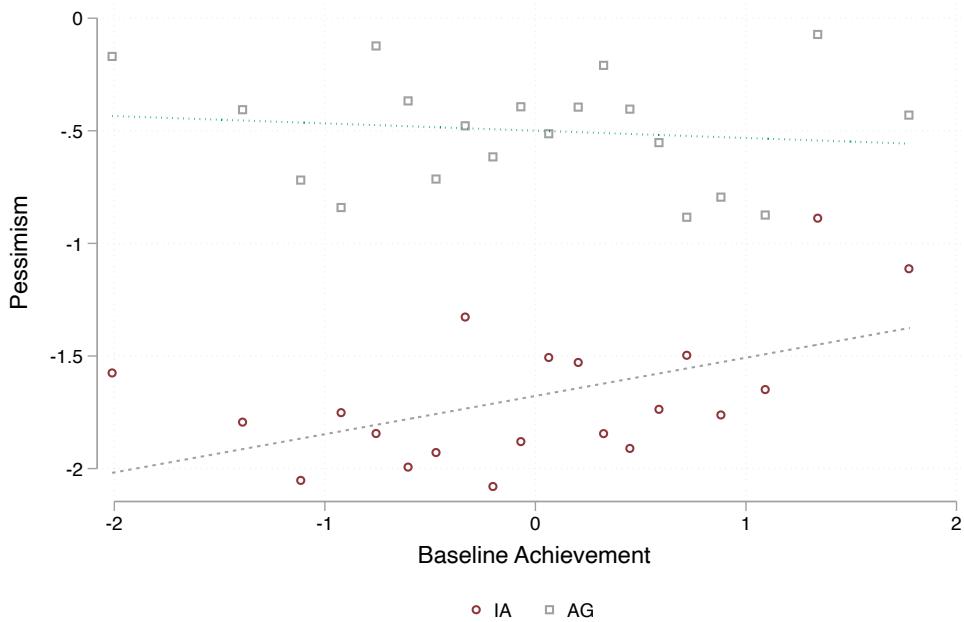
*Notes:* This table reports IA and AG mean and standard deviations for each Zone of Choice in our sample. IA and AG are in terms of pessimism as defined in the main text. Standard deviations are reported in brackets underneath their corresponding mean. Column 3 reports the number of observations with elicited beliefs in each market.

Figure F.2: Pessimism-Achievement Relationship

(a) All Options on Rank-Ordered List



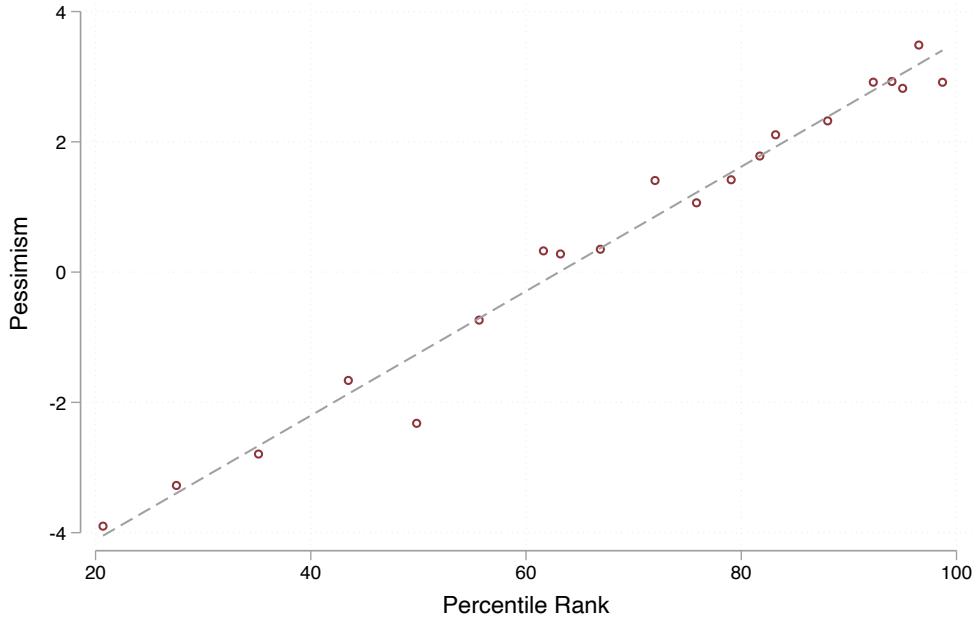
(b) Only Top-Ranked Option on Rank-Ordered List



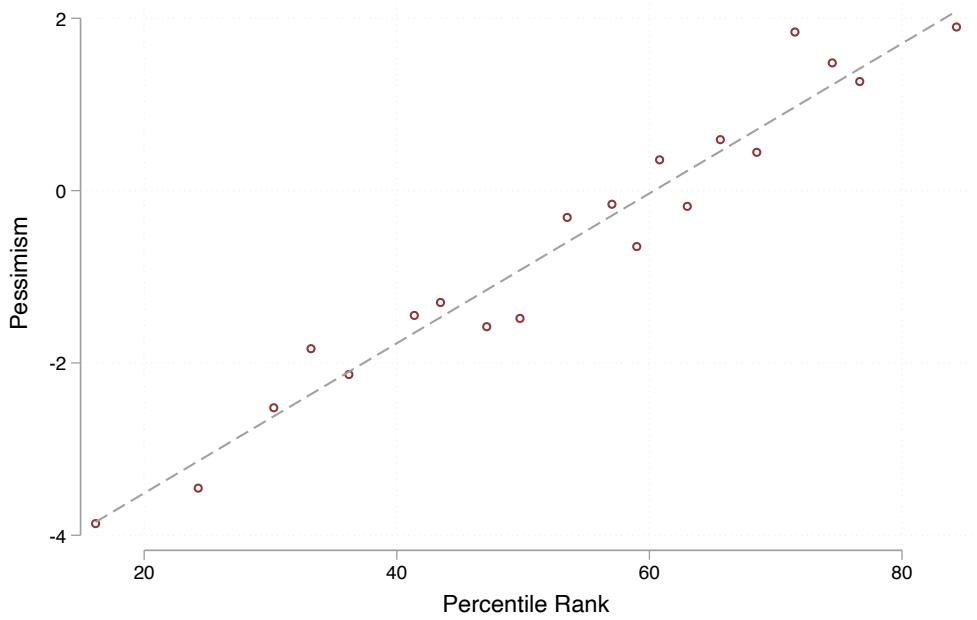
*Notes:* This figure reports bivariate-binned scatter plots of the pessimism-achievement relationship. Panel (a) reports the relationship across all options contained on the rank-ordered list, while Panel (b) reports the relationship only among the top-ranked option of applicants' rank-ordered lists.

Figure F.3: AG Bias-Truth Relationship

(a) All Options on Rank-Ordered List



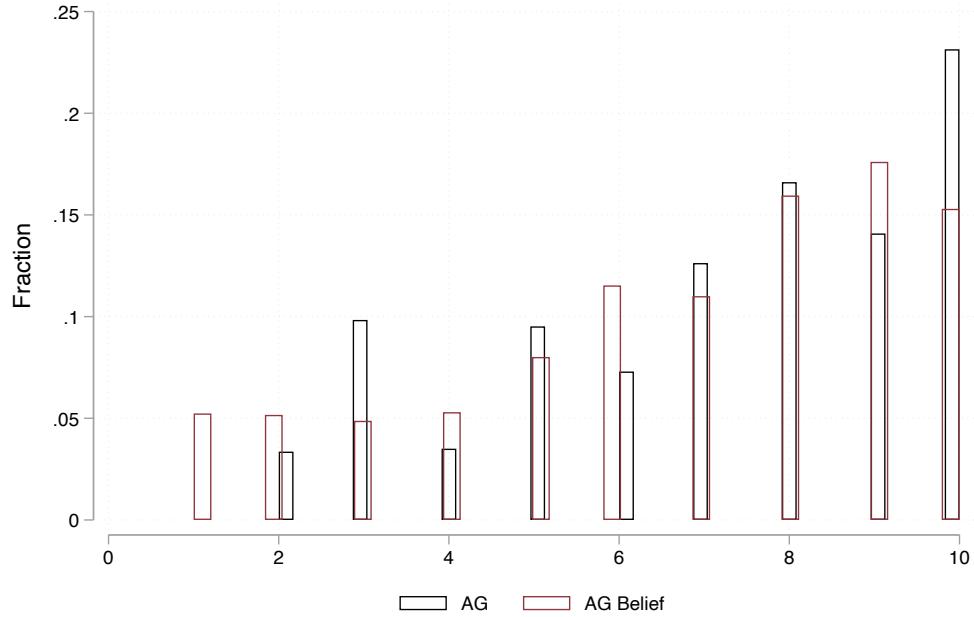
(b) IA Bias-Truth Relationship



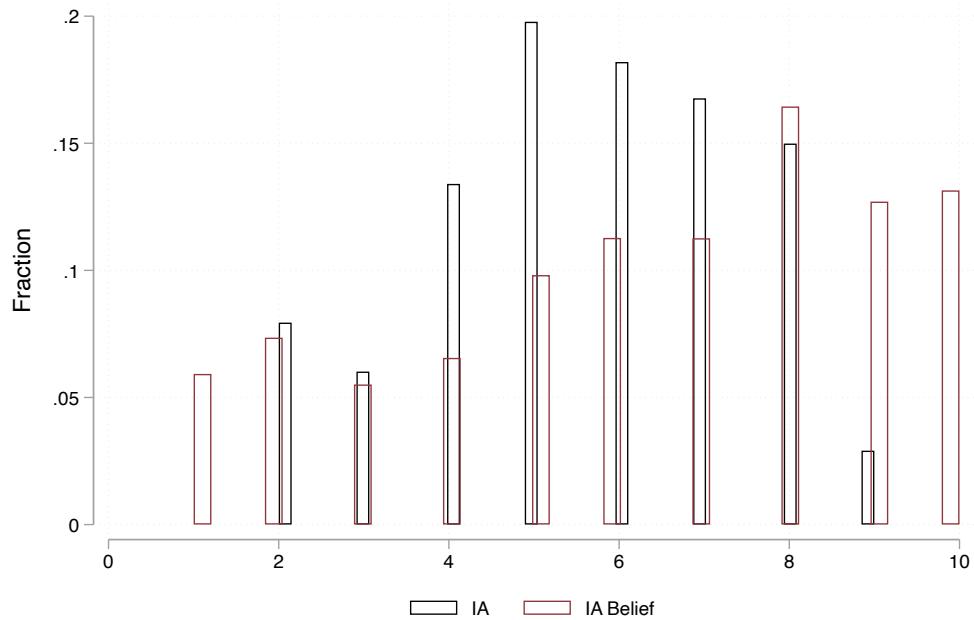
*Notes:* This figure reports bivariate-binned scatter plots of the pessimism-achievement relationship. Panel (a) reports the relationship across all options contained on the rank-ordered list, while Panel (b) reports the relationship only among the top-ranked option of applicants' rank-ordered lists.

Figure F.4: AG Decile and AG Belief Distribution

(a) Achievement Growth



(b) Incoming Achievement



*Notes:* This figure reports option-specific distributions of AG (IA) deciles and AG (IA) beliefs. If applicants' decile beliefs were perfectly on target, then their belief distribution would perfectly overlap with the decile distribution.

### F.0.1 Beliefs versus Researcher-Estimated Quality

With elicited beliefs and baseline rank-ordered lists, one can assess how families trade off IA and AG beliefs in comparison to researcher-estimated IA and AG. This exercise is similar to work that estimates preferences using revealed preference arguments (Abdulkadiroğlu et al., 2020, Beuermann et al., 2022), with a key difference being that I can also relate choices to beliefs about the quality measures, similar to (Ainsworth et al., 2023).

In this descriptive exercise, I can relate baseline choices to beliefs and researcher-estimated quality measures. In particular, the indirect utility of school  $j$  for student  $i$  is

$$U_{ij} = \gamma_P Q_j^P + \gamma_S Q_j^S - \lambda d_{ij} + \varepsilon_{ij},$$

where  $Q_j^P$  and  $Q_j^S$  are estimated school and peer quality. I can compare this model to one where families trade off beliefs about  $Q_j^P$  and  $Q_j^S$ :

$$\tilde{U}_{ij} = \tilde{\gamma}_P \tilde{Q}_{ij}^P + \tilde{\gamma}_S \tilde{Q}_{ji}^S - \tilde{\lambda} d_{ij} + \tilde{\varepsilon}_{ij}.$$

Comparing the estimates of  $\frac{\tilde{\gamma}_S}{\tilde{\gamma}_P}$  to  $\frac{\gamma_P}{\gamma_S}$  tell us how families differentially trade off school and peer quality when using their actual beliefs and when using researcher-generated measures of quality that are common in the literature.

Appendix Table F.6 reports estimates from these exercises. Columns 1 and 2 correspond to estimates using researcher-estimated IA and AG, while Columns 3 and 4 correspond to estimates using elicited beliefs. Given the discrete nature of the survey-elicited beliefs, each model bins quality deciles, omitting the worse category in the support of a given measure. Columns 3 and 4 show that families trade off IA and AG beliefs at similar rates and prefer larger values of each. Interestingly, many families report not knowing about some schools in their choice set, and they tend to have a preference for those over schools in the bottom decile of the IA and AG distribution. In other words, they are willing to take on some uncertainty over school quality as opposed to enrolling their children in a school they believe to be the worst quality. In comparison to the estimates in Columns 1 and 2, the implied willingness to travel measures are significantly larger in the beliefs model. This suggests that existing estimates in the literature using researcher-estimated quality measures potentially misstate preferences.

It is important to note that the survey results come from a self-selected group of families that chose to participate and share their beliefs. The students in these families who responded to the survey are performing  $0.07\sigma$  below the district average; in comparison all survey recipients are performing  $0.14\sigma$  lower than the average student in the district. It is also worth mentioning that the families that responded to the survey are more likely to have parents with a college education. Despite these differences, the differences between the students in these families and other students in the district are not too stark.<sup>24</sup>

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<sup>24</sup> Appendix Table F.1 reports the differences between survey respondents and non-respondents.

Table F.6: Preference Estimates: Beliefs and Estimated Quality

	Estimated Quality		Elicited Beliefs	
	(1) AG	(2) IA	(3) AG	(4) IA
Decile 2			0.344 (0.104)	0.056 (0.093)
Decile 3	0.215 (0.052)	0.574 (0.052)	0.343 (0.111)	0.073 (0.102)
Decile 4	0.204 (0.064)	0.454 (0.039)	0.280 (0.111)	0.170 (0.102)
Decile 5	0.608 (0.056)	0.467 (0.039)	0.327 (0.110)	0.211 (0.101)
Decile 6	0.229 (0.065)	0.573 (0.041)	0.424 (0.110)	0.405 (0.101)
Decile 7	0.390 (0.050)	0.539 (0.045)	0.527 (0.110)	0.498 (0.102)
Decile 8	0.183 (0.048)	0.491 (0.046)	0.692 (0.109)	0.776 (0.101)
Decile 9	0.268 (0.051)	0.714 (0.068)	0.906 (0.110)	0.915 (0.104)
Decile 10	0.470 (0.050)		1.221 (0.115)	1.049 (0.109)
Unknown School			0.333 (0.140)	0.116 (0.134)
Distance		-0.028 (0.009)		-0.014 (0.009)

*Notes:* This table reports willingness to travel estimates for enrolling in different ranked school deciles relative to the lowest quality school in the model. These estimates are derived from rank-ordered logit models with distance and quality decile indicators for both IA and AG. Column 1 and Column 2 report willingness to travel estimates for a model considering researcher-estimated quality, and Column 3 and Column 4 report willingness to travel estimates using elicited beliefs. The first model reports willingness to travel estimates relative to schools in the bottom two deciles, while the belief model estimates willingness to travel estimates relative to bottom decile schools in terms of beliefs. The belief model also reports willingness to travel estimates for unknown schools; that is, schools parents admitted they had not heard about during the baseline survey. Robust standard errors are reported in parentheses.

## G Additional Experiment Results

In this section, I report additional experimental evidence discussed in the main paper. To begin, I report experimental balance induced by both the school and individual-level randomization. I then report disaggregated estimates for each experimental arm and evidence regarding other outcomes of interest. I then report evidence discussed in the paper but with corresponding randomization-based inference. Heterogeneity results follow along with other estimates for different groups. I conclude with a few additional points from the discrete choice framework.

## G.1 Experimental Balance

Table G.1: Saturation School-Level Balance

	Control (1)	Low – Control (2)	High – Control (3)
Reading Scores	-0.094 (0.104)	-0.051 (0.111)	-0.069 (0.111)
Math Scores	-0.108 (0.096)	-0.054 (0.103)	-0.076 (0.103)
Parents College +	0.082 (0.024)	0.007 (0.028)	-0.012 (0.028)
Migrant	0.086 (0.007)	-0.011 (0.013)	0.006 (0.013)
Female	0.495 (0.01)	-0.016 (0.01)	-0.004 (0.01)
Poverty	0.9540 (0.035)	-0.024 (0.029)	0.026 (0.029)
Special Education	0.115 (0.008)	0.015 (0.01)	0.021 (0.01)
English Learner	0.158 (0.016)	0.014 (0.019)	0.032 (0.019)
Black	0.051 (0.013)	-0.007 (0.015)	-0.012 (0.015)
Hispanic	0.863 (0.043)	-0.011 (0.033)	0.013 (0.033)
White	0.001 (0.001)	0 (0)	-0.001 (0)
Number of Schools	40	32	32

*Notes:* This table reports estimates from school-level regressions of row variables on saturation-specific indicators and zone fixed effects. The schools are stacked across both years. Column 1 reports the control school means, and Columns 2 and 3 report low- and high-saturation school differentials. Robust standard errors are reported in parentheses.

Table G.2: Within-School Randomization Balance

	Control (1)	Peer – Control (2)	School – Control (3)	Both – Control (4)	P-Value (5)
Reading Scores	-0.126	0.006 (0.02)	-0.015 (0.02)	-0.006 (0.024)	0.86
Math Scores	-0.124	0.013 (0.017)	-0.01 (0.016)	-0.018 (0.019)	0.607
Parents College	0.077	-0.001 (0.005)	-0.001 (0.004)	0 (0.005)	0.993
Migrant	0.034	0.006 (0.004)	-0.002 (0.004)	0.004 (0.003)	0.182
Female	0.485	-0.005 (0.009)	0.001 (0.01)	0.003 (0.008)	0.892
Poverty	0.938	0.001 (0.004)	0 (0.003)	-0.005 (0.004)	0.561
Special Education	0.138	-0.002 (0.006)	0.008 (0.007)	-0.002 (0.006)	0.597
English Learner	0.152	0.002 (0.005)	0.001 (0.006)	0.013 (0.007)	0.324
Black	0.031	0.002 (0.003)	-0.004 (0.003)	0.002 (0.004)	0.663
Hispanic	0.906	-0.004 (0.005)	0.003 (0.005)	-0.005 (0.004)	0.506
White	0.016	-0.002 (0.002)	0 (0.002)	0.001 (0.002)	0.802
Joint Test P-Value		0.769	0.951	0.716	
Number Treated	13,954	3,329	3,351	4,636	

Notes. Column 1 reports within-school control group means, and Columns 2–4 contain mean differences between treated and control group individuals. Column 5 contains *p*-values on a joint test of equality of means across groups for that given row. The *p*-values reported on the bottom of the table come from a column-wise test of no difference between the treated and control groups. Note that the population in this table is those assigned to non-pure control schools. Standard errors are clustered at the school level for all tests.

## G.2 Additional Evidence and Outcomes

The experiment's design contains eight treatment groups whose effects can be estimated using the following regression specification

$$\begin{aligned}
Y_i = \alpha_z + & \underbrace{\beta_{Ph} T_i^P \times D_{s(i)}^h + \beta_{Sh} T_i^S \times D_{s(i)}^h + \beta_{Bh} T_i^B \times D_{s(i)}^h}_{\text{High Saturation Effects}} \\
& + \underbrace{\beta_{P\ell} T_i^P \times D_{s(i)}^\ell + \beta_{S\ell} T_i^S \times D_{s(i)}^\ell + \beta_{B\ell} T_i^B \times D_{s(i)}^\ell}_{\text{Low Saturation Effects}} \\
& + \underbrace{\beta_h C_i \times D_{s(i)}^h + \beta_\ell C_i \times D_{s(i)}^\ell}_{\text{Spillover Effects}} + u_i,
\end{aligned} \tag{23}$$

where  $\alpha_z$  is a zone fixed-effect (or randomization block),  $T_i^x$  are individual-level treatment  $x$  indicators for  $x \in \{P, S, B\}$ ,  $D_{s(i)}^x$  are school-level treatment indicators, and  $C_i$  are individual-level indicators for untreated parents. The specification contains a total of eight saturation-specific parameters of interest.  $\beta_{xh}$  and  $\beta_{x\ell}$  are treatment  $x \in \{P, S, B\}$  effects for high- and low-saturation groups, respectively, and  $\beta_h$  and  $\beta_\ell$  are saturation-specific spillover effects. All parameters are identified with comparisons to families in pure control schools. This design is a multiple treatment extension of other work studying spillover effects across a variety of domains (Andrabi et al., 2020, Crépon et al., 2013). Standard errors are robust and clustered at the school level.

Appendix Table G.3 and Appendix Table G.4 report estimates for the 2019 and 2021 wave, respectively. Column 1 reports effects on most-preferred school AG, and Column 2 reports effects on most-preferred IA. Each column reports estimates for the eight parameters from the full specification. Effect sizes tend to be similar within saturation group. For example, I cannot reject that most preferred AG impacts are the same for those in the high-saturation treatment arm regardless of being directly treated or in the spillover group. The same is true for most-preferred IA. The evidence motivates the aggregation of the evidence reported throughout the paper.

Table G.3: Baseline Experimental Effects 2019 Wave

	(1)	(2)
	AG	IA
High-Saturation Treatment		
Peer Quality	3.966 (3.259)	-5.222** (2.462)
School Quality	3.117 (3.164)	-5.317** (2.373)
Both	3.123 (3.217)	-4.99** (2.396)
Low-Saturation Treatment		
Peer Quality	1.885 (2.803)	-5.294* (2.821)
School Quality	0.495 (2.997)	-4.719* (2.806)
Both	3.376 (2.805)	-5.213* (2.807)
Spillover Treatment		
High Saturation	2.322 (2.843)	-5.867** (2.444)
Low Saturation	1.519 (2.814)	-5.267* (2.839)
Pure Control Mean	65.739	45.749
R2	0.240	0.400
N	11,541	11,541

*Notes:* This table reports baseline experimental effects from the 2019 wave of the experiment. Estimates come from regressions of most-preferred AG (IA) on eight separate treatment indicators, including two saturation-specific spillover indicators, and three saturation-specific information-specific indicators. Column 1 reports estimates for a model with most-preferred AG as the outcome, and Column 2 reports estimates from a model with most-preferred IA as the outcome. Standard errors are robust and clustered at the school level.

Table G.4: Baseline Experimental Effects, 2021 Wave

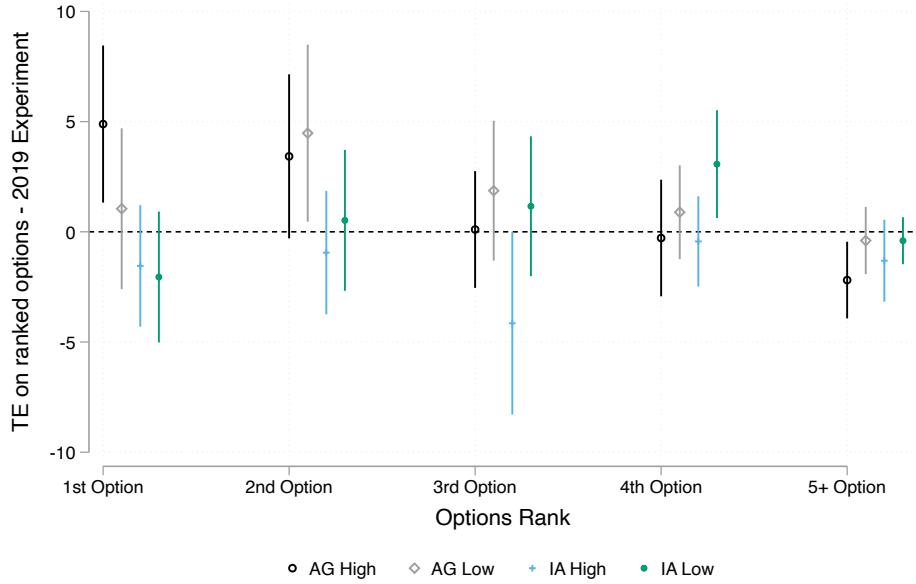
	(1)	(2)
	AG	IA
<b>High-Saturation Treatment</b>		
Peer Quality	6.307 (4.156)	-3.007 (2.16)
School Quality	7.816** (3.717)	-2.659 (2.37)
Both	7.241* (4.029)	-3.852* (2.226)
<b>Low-Saturation Treatment</b>		
Peer Quality	0.871 (3.41)	0.563 (2.231)
School Quality	0.205 (3.416)	0.079 (2.48)
Both	1.322 (3.369)	1.037 (2.317)
<b>Spillover Treatment</b>		
High Saturation	5.91 (4.09)	-3.308* (1.949)
Low Saturation	0.787 (3.313)	0.171 (2.274)
Pure Control Mean	66.914	51.647
R2	0.290	0.380
N	9,008	9,008

*Notes:* This table reports baseline experimental effects from the 2021 wave of the experiment. Estimates come from regressions of most-preferred AG (IA) on eight separate treatment indicators, including two saturation-specific spillover indicators, and three saturation-specific information-specific indicators. Column 1 reports estimates for a model with the most-preferred AG as the outcome, and Column 2 reports estimates from a model with most-preferred IA as the outcome. Standard errors are robust and clustered at the school level.

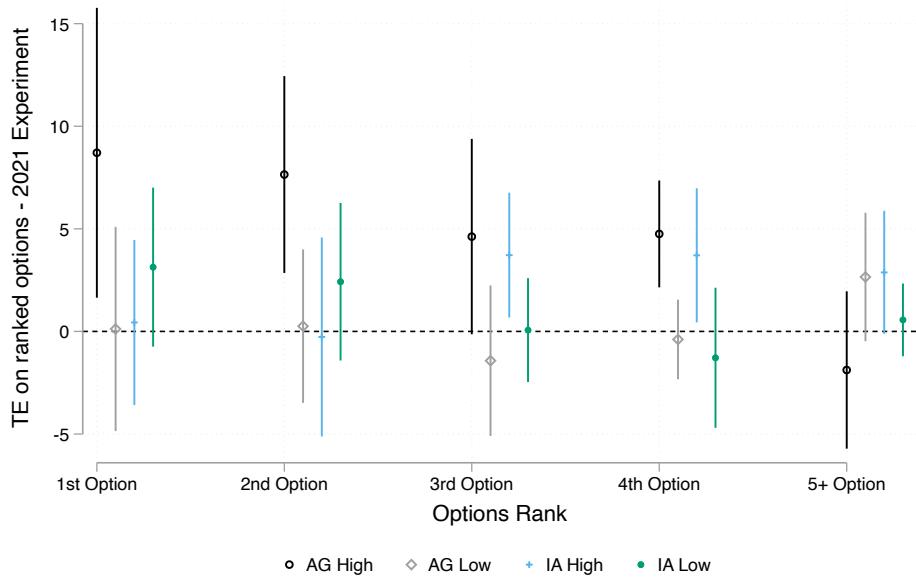
### G.2.1 Impacts Across the Rank-Ordered List

Appendix Figure G.1 reports effects across the entire rank-ordered list. Panel (a) reports 2019 effects, and Panel (b) reports 2021 effects. I aggregate all options at the fifth position of the list or greater into a single group but otherwise report rank-specific effects. Common to both years is the finding of effects mostly among the highly saturated group, limited to just effects on school AG, and they are more pronounced at the top of the list. The effects are larger and more persistent for the 2021 wave, with measured and significant effects through the fourth-ranked option ranging between 5 and 9 AG percentile points. This finding reveals that families in highly saturated areas systematically choose schools with higher AG scores while not compromising their school IA scores.

Figure G.1: Treatment Effects across the Rank-Ordered List



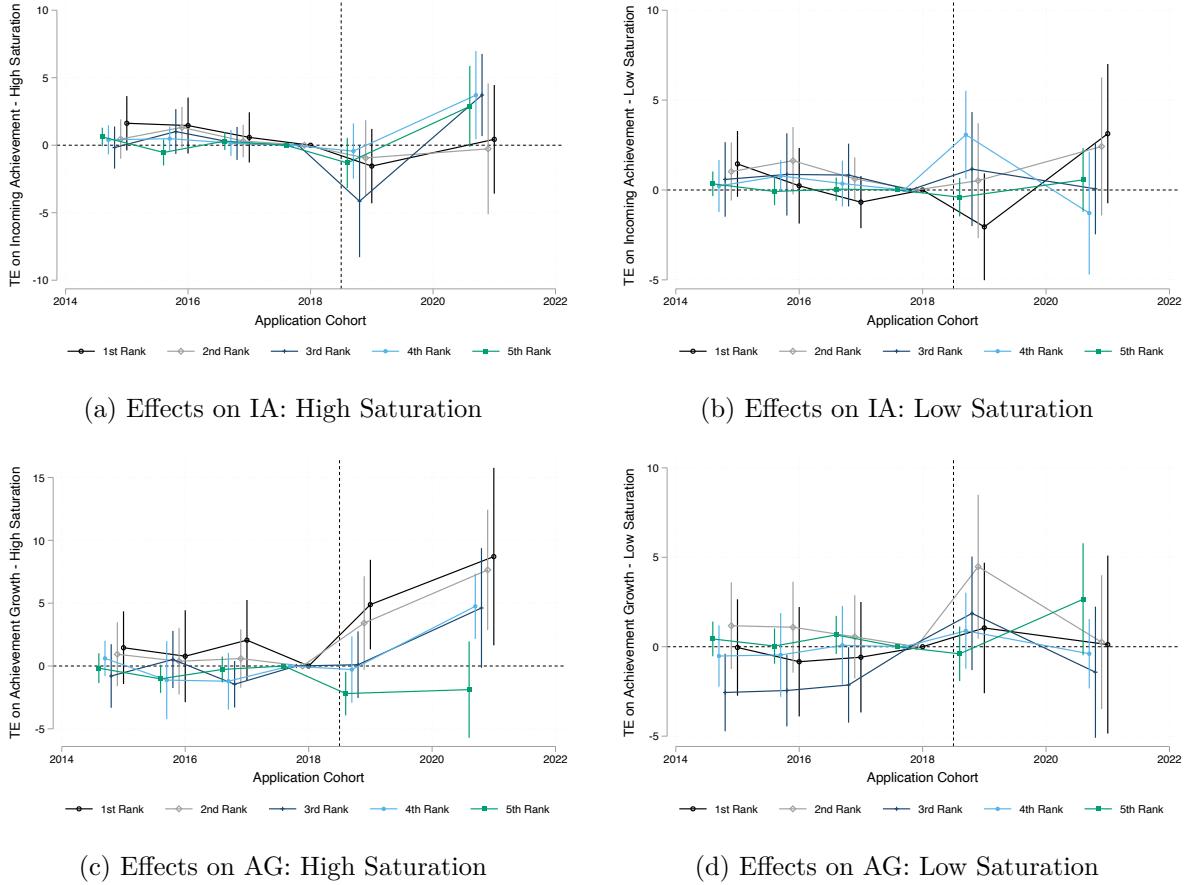
(a) 2019 Effects



(b) 2021 Effects

*Notes:* This figure reports difference-in-difference estimates from models considering four different school-level treatments. These estimates come from regressions of rank-specific school attributes—either incoming achievement or achievement growth—on year and treatment group fixed effects along with treatment group indicators interacted with event-time indicators. In contrast to Figure ??, this figure reports 2019- and 2021-specific effects, omitting other event-time estimates, and instead reports rank-specific estimates. Schools ranked as the fifth option or lower are grouped into a single group. All estimates are identified by comparisons with pure control schools. The omitted year is 2018, the year before the first wave of the intervention. Standard errors are robust and clustered at the school level.

Figure G.2: Treatment Effects across the Rank-Ordered List

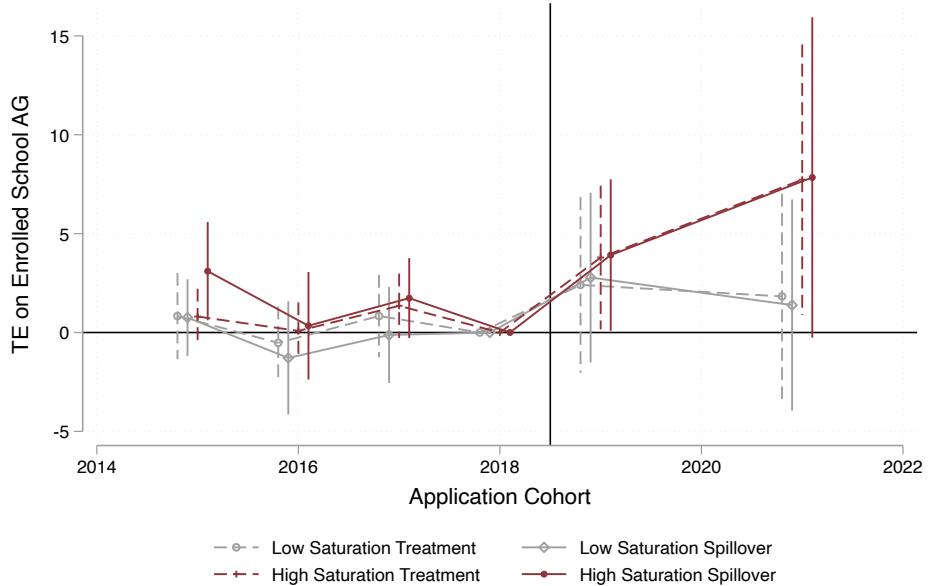


*Notes:* This figure reports difference-in-difference estimates on most-preferred IA and AG across the rank-ordered list. Each subfigure reports treatment effects that are saturation-specific for different most-preferred attributes. Subfigure (a) and Subfigure (b) correspond to estimates from the same model, and Subfigure (c) and Subfigure (d) correspond to estimates from the same model. Within each subfigure, each line within each figure corresponds to treatment effects on schools ranked at different portions of the rank-ordered list estimated separately. Estimates come from difference-in-differences regressions of most-preferred attributes on saturation-specific indicators, treatment group indicators, year indicators, and baseline controls. 95 percent confidence intervals are reported by bars and standard errors are robust and clustered at the school level.

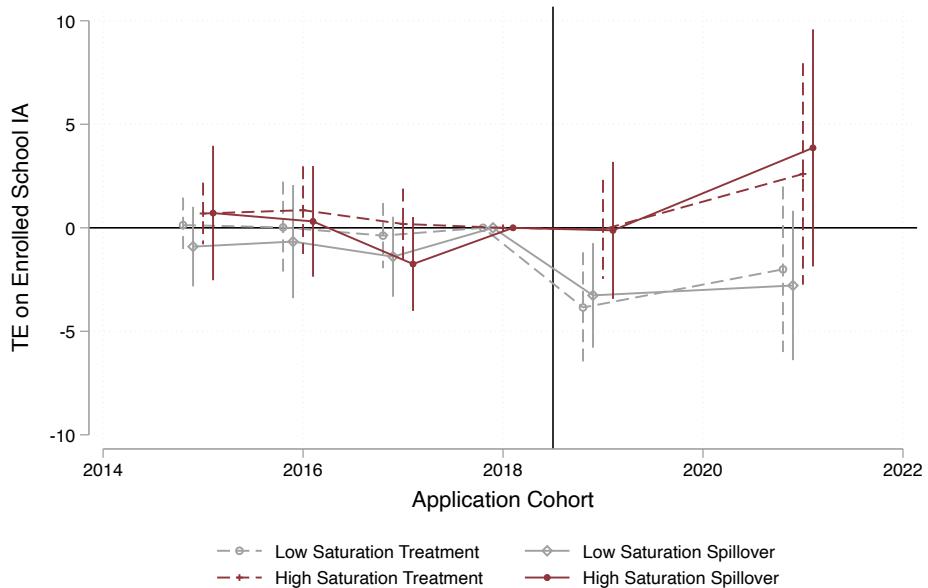


## G.2.2 Impacts on Enrollment

Figure G.3: Difference-in-Difference Estimates



(a) Impacts on Enrolled School Achievement Growth



(b) Impacts on Enrolled School Incoming Achievement

*Notes:* This figure reports difference-in-difference estimates from models considering four different school-level treatments. These estimates come from regressions of ninth-grade enrolled school attributes—either incoming achievement or achievement growth—on year and treatment group fixed effects along with treatment group indicators interacted with event-time indicators. All estimates are identified by comparisons with pure control schools. The omitted year is 2018, the year before the first wave of the intervention. Standard errors are robust and clustered at the school level.

### G.3 Randomization Inference

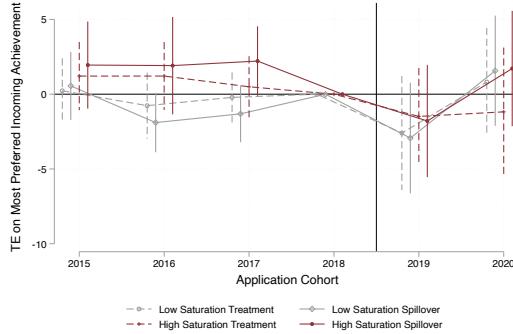
Table G.5: Difference-in-differences Estimates with Randomization Inference

	Achievement Growth				Incoming Achievement			
	High		Low		High		Low	
	Direct	Spillover	Direct	Spillover	Direct	Spillover	Direct	Spillover
2015	1.4	1.97	-.14	.06	1.52	2.62	1.29	1.69
	(1.73)	(2.05)	(1.67)	(1.58)	(1.2)	(1.4)	(1.18)	(1.05)
	[.304]	[.256]	[.488]	[.478]	[.196]	[.105]	[.78]	[.127]
2016	.91	-.24	-1.06	-.4	1.51	1.01	.51	-.25
	(2.18)	(2.35)	(1.92)	(1.74)	(1.23)	(1.58)	(1.27)	(1.24)
	[.407]	[.462]	[.38]	[.455]	[.206]	[.66]	[.625]	[.458]
2017	1.94	3.06	-.58	-.72	.48	1.49	-.69	-.73
	(1.89)	(2.29)	(1.81)	(1.94)	(1.11)	(1.17)	(.95)	(.86)
	[.232]	[.168]	[.424]	[.4]	[.388]	[.188]	[.323]	[.295]
2019	4.96	4.24	1.18	.77	-1.49	-2.07	-1.99	-2.19
	(2.13)	(2.27)	(2.17)	(2.28)	(1.64)	(1.81)	(1.77)	(1.81)
	[.045]	[.096]	[.351]	[.411]	[.746]	[.792]	[.778]	[.807]
2021	8.85	7.87	.09	.11	.49	.43	3.26	2.87
	(4.18)	(4.44)	(2.96)	(2.98)	(2.42)	(2.18)	(2.3)	(2.36)
	[.066]	[.107]	[.486]	[.489]	[.434]	[.456]	[.139]	[.182]

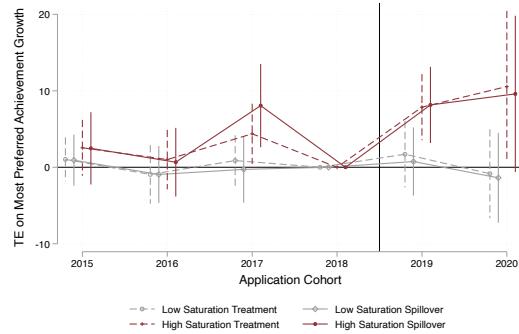


## G.4 Heterogeneity

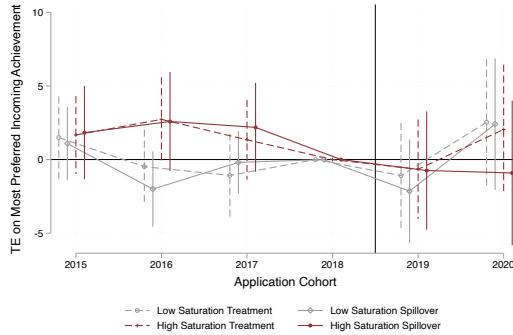
Figure G.4: Estimates by Baseline Achievement



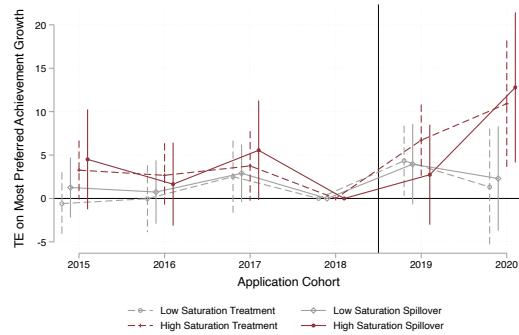
(a) Effects on IA for Low Achievers



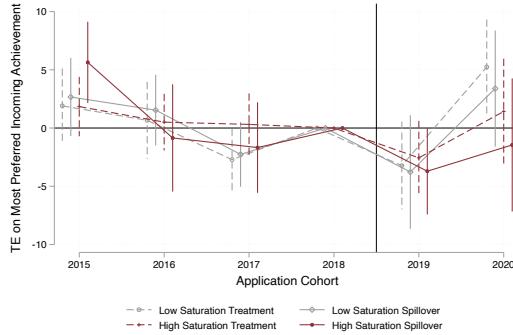
(b) Effects on AG for Low Achievers



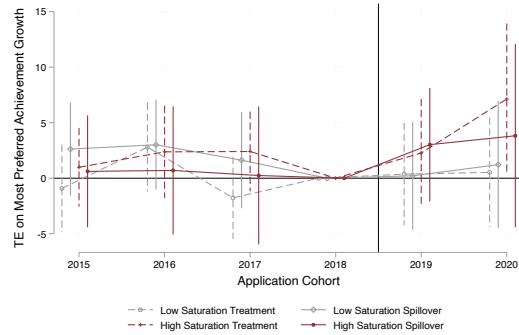
(c) Effects on IA for Moderately-Low Achievers



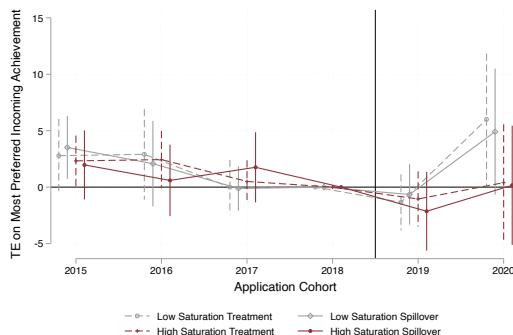
(d) Effects on AG for Moderately-Low Achievers



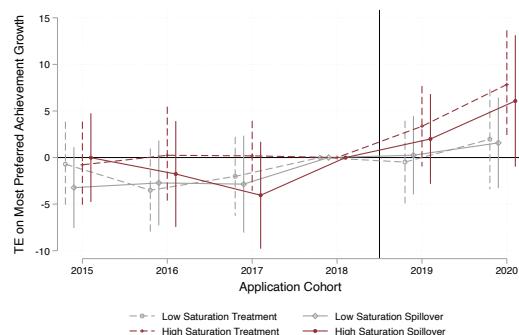
(e) Effects on IA for Moderately-High Achievers



(f) Effects on AG for Moderately-High Achievers



(g) Effects on IA for High Achievers



(h) Effects on AG for High Achievers

## G.5 Additional Discrete Choice Results

The subsequent rows show that families receiving information reduce their willingness to travel for IA and increase their willingness to travel for AG regardless of the information treatment. The effects are larger for those in highly saturated areas than those in less saturated areas. Mirroring the reduced-form results, I find appreciable spillover effects, with their magnitudes closely matching saturation-specific treatment effects. Families in treated schools are willing to travel anywhere between 0.25 and 0.62 additional miles to enroll their children in schools with 10 percentile point higher AG scores, all else equal. The magnitudes are sensible given the dense nature of ZOC markets, where families choice sets mostly consider of nearby schools. Columns 3 and 4 report effects for models that include school effects, absorbing weights for untreated parents. The findings are qualitatively similar with one key difference: low-saturation effects on willingness to travel for AG are less pronounced. Overall, the findings demonstrate that families' choices responded in a way that rewards effective schools, a crucial channel governing the success of school choice policies.

Table G.7: Willingness to travel estimates and impacts: Saturation-specific Model

	WTT Estimates		P-value
	IA	AG	
<b>Treatment</b>			
Untreated	0.391*** ( 0.093)	0.656*** ( 0.077)	0.018
Information: High	-0.977*** ( 0.154)	0.616*** ( 0.095)	0.000
Information: Low	-0.743*** ( 0.147)	0.312*** ( 0.088)	0.000
Spillover: High	-1.358*** ( 0.322)	0.642*** ( 0.196)	0.000
Spillover: Low	-0.852*** ( 0.175)	0.255** ( 0.105)	0.000
Distance		-0.068*** ( 0.006)	
Number of Choices	142,589		
Number of Students	21,774		

*Notes:* This table reports estimates from the model outlined in Equation 23. Column (1) corresponds to estimates of IA utility weights and Column (2) corresponds to estimates of AG utility weights. Rows labeled as Untreated correspond to utility weight estimates for families in the pure control group. Untreated rows correspond to utility weight estimates for families in the pure control group. Information: High, Information: Low correspond to families in high and low saturation schools, respectively. Spillover: High and Spillover: Low are defined similarly. Each cell, except for distance estimates, report estimates in willingness to travel units. These are calculated by dividing the unreported utility weight estimate (or impact) by the corresponding distance disutility estimate. Column (3) reports the p-value of a test of equality of estimates in Column (1) and (2) within a row. Standard errors are reported in parentheses and estimated via the delta method.

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