

Geodemographics of Student List Purchases by Public Universities: A First Look

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1 Introduction

On March 8th 2020, a selective public research university ordered several “student lists” from College Board. Student lists contain the contact information of prospective students. Several orders targeted women in STEM fields, including an order given the title “NR 2021 Female AP STEM,” which targeted nonresident high school students from 26 states, who identified as female, were in the high school class of 2021, had a high school GPA of B to A+, and received a 4 or higher on an AP exam in a STEM subject (e.g., calculus, biology, chemistry, computer science, statistics). Another order titled “NR 2021 Female SAT STEM” targeted the same prospects except the AP exam search filter was replaced with scoring between a 1300 and 1600 on the SAT [MAYBE CUT THIS SENTENCE].

The university purchases lists of prospective female STEM students in order to overcome the under-representation of women in STEM degree programs, which has been a nationwide policy concern for decades [CITE]. However, an analysis of the purchased prospects suggests that efforts to overcome one problem are creating other problems. Figure X shows recruiting female STEM prospects based on AP scores yields a set of prospects from almost exclusively affluent communities and they are recruiting prospects who identify as white or Asian but not prospects who identify as Black or Latinx. [ONE OR TWO SENTENCES GIVING RESULTS]. These results are consistent with socioeconomic and racial disparities in access to AP coursework.

Although prior research suggests that student lists have a surprisingly large effect on college access (Howell, Hurwitz, Mabel, & Smith, 2021; Moore, 2017; Smith, Howell, & Hurwitz, 2021), the women in STEM vignette highlights concern of who is being included. We argue that student list products exclude students in two ways. First, universities cannot purchase the contact information of prospects who are not included in the underlying database. In

general, College Board and ACT student list products only include test-takers, but test-taking rates differ substantially across race and class (Hyman, 2017).¹ Second, the “search filters” on student list products enable universities to choose the prospects included in a purchase. While universities choose filters based on their preferences, these choices are structured by what the product allows. Several search filters (e.g., zip-code, AP exam score, “geodemographic” segment) may systematically exclude protected classes and other populations that are underrepresented in higher education (e.g., rural students).

Prior research has not examined which filter criteria universities select when purchasing student lists, what are the characteristics of purchased prospects, or the relationship between filter criteria and student characteristics. We collected data about student list purchases by issuing public records requests to public universities in five states. This report focuses on student lists purchased from College Board and addresses three research questions:

1. Which filter criteria were selected in student lists purchased by universities in our sample?
2. What are the characteristics of prospects included in student lists purchased by universities in our sample?
3. What is the relationship between student list filter criteria and the characteristics of purchased prospects?

2 Background

This section provides relevant background information by situating student lists within the recruiting process, reviewing recent research on the relationship between student lists and student outcomes, and explaining how universities buy lists and what information they contain. We focus on lists sold by College Board, which are the focus of empirical analyses.

2.1 Situating Student Lists within Recruiting

Similar to the visual metaphor of the “STEM pipeline,” the “enrollment funnel” – depicted in Figure 1 – is a conceptual model used in the enrollment management industry to describes stages in the process of recruiting students. The funnel begins with a large pool of “prospects” that the university would like to convert into customers. “Leads” are prospects whose contact information has been purchased. “Inquiries” are prospects that contact your

¹FOOTNOTE; ACT NRCCUA

institution and consist of two types: first, inquiries who respond to an initial solicitation (e.g., email) from the university; and second, “student as first contact” inquiries who reach out to the university on their own (e.g., by sending ACT scores). The funnel narrows at each successive stage – inquiries, applicants, admits – in order to convey the assumption of “melt” at each stage (e.g., a subset of “inquiries” will apply). Practically, the enrollment funnel informs interventions that increase the probability of “conversion” from one stage to another (Campbell, 2017). For example, financial aid packages convert admits to enrolled students.

Figure 1: The enrollment funnel



At the top of the enrollment funnel, universities identify leads by buying “student lists.” Sometimes referred to as “names,” student lists are the fundamental input for recruiting interventions that target individual prospects via mail, email, text, and on social media. The sum of purchased leads plus student-as-first-contact inquiries (e.g., filled out an online admissions inquiry form) constitutes the set of all prospects the university has contact information for, who are eligible to receive targeted recruiting interventions from the university.

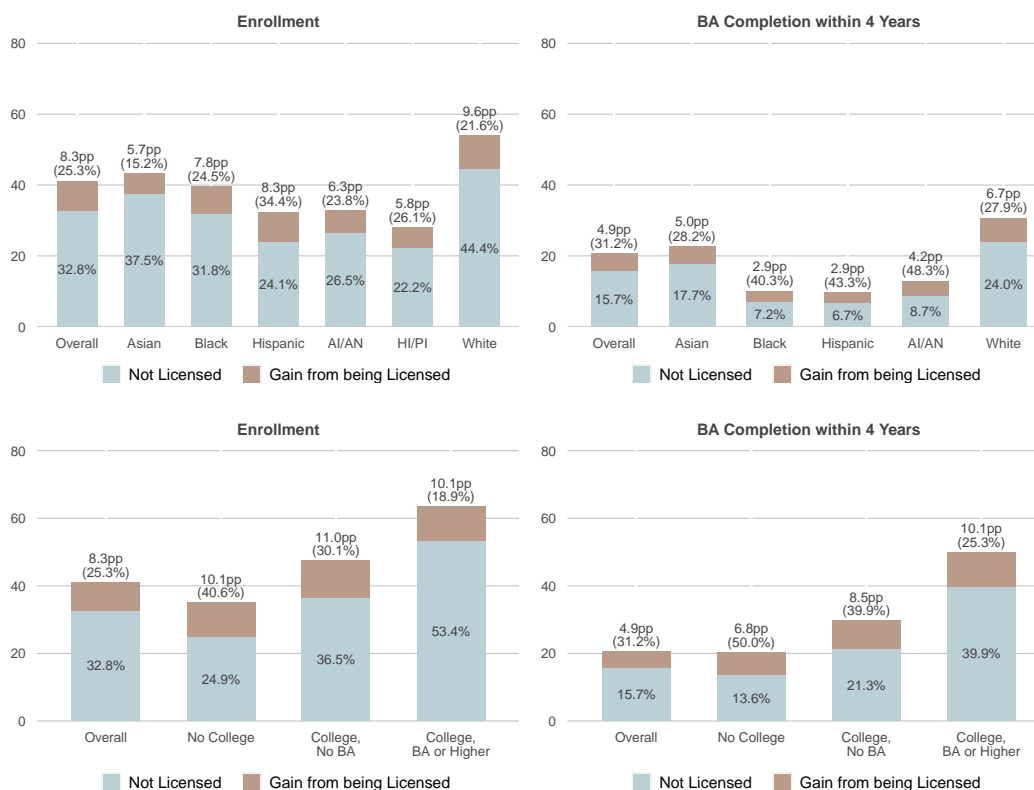
2.2 Student Lists and Student Outcomes

Research suggests that student lists substantially affect college access outcomes – and in turn degree completion outcomes – for millions of students each year. Howell, Hurwitz, Mabel, & Smith (2021) compared SAT test-takers who opted into the College Board Student Search Service – allowing accredited institutions to “licence” their contact information – and test-takers who opted out, after controlling for covariates. Figure 2 reproduces the main results. For students with the same values of SAT score, parental education, race/ethnicity, sex, high school graduation year, and who attended the same high school, 41.1% of students who participated in Search attended a 4-year college compared to 32.8% of students who opted out, representing an 8.3 ($=41.1-32.8$) percentage point difference and a 25.3 ($=(41.1-32.8)/32.8$) percent change in the relative probability of attending a 4-year college (for a similar analysis of ACT’s Educational Opportunity Service (EOS) see Moore (2017)).

Figure 2 shows that participating in Search was associated with a larger percent change in the probability of attending a 4-year institution for students who identified as Black (24.5% $=(39.6-31.8)/31.8$), Latinx (34.4%), American Indian or Alaska Native (23.8%), and Native Hawaiian or Pacific Islander (26.1%) than it was for students who identified as White (21.6%) or Asian (15.2%). Similarly, the percent change in the probability of attending a four-year college was higher for students whose parents did not attend college (40.6%) than it was for students whose parents had a BA (18.9%).

Student lists may also affect degree completion through their effect on initial postsecondary institution. Howell, Hurwitz, Mabel, & Smith (2021) analyzed the four-year BA degree completion rates of SAT test-takers from the 2015 and 2016 high school graduation cohorts. Figure 2 shows that 20.6% of students who participated in Search obtained a BA in four years compared to 15.7% of students who opted out, representing a 31.2% ($=(20.6-15.7)/15.7$) increase in the relative probability of graduation. Furthermore, the relative increase in the probability of obtaining a BA was higher for Black (40.3%), Hispanic (43.3%), and Native American/Alaska Native students (48.3%) than it was for White (27.9%) and Asian (28.2%) students. The relative increase was also higher for students whose parents did not attend college (50.0%) than it was for students whose parents had a BA (25.3%).

Figure 2: Effects of College Board Student Search Service



Note: AI/AN = American Indian or Alaska Native. HI/PI = Hawaiian or Pacific Islander. The sample for enrollment outcomes includes all SAT takers in the 2015–2018 high school graduation cohorts. The sample for completion outcomes is restricted to students in the 2015–2016 cohorts. Completion results are not reported for HI/PI students due to very small sample size ($N=2,749$), which returns imprecise estimates. Results are estimated from regressions that include student-level controls for: sex, race/ethnicity, SAT score, parental education level, last Student Search Service opt-in status, and graduation cohort and high school fixed effects. All differences between students whose names were licensed and those whose names were not licensed are statistically significant at the 1% level.

2.3 Buying Student Lists

The largest student list vendors are College Board and ACT, which create student list products based on their database of test takers. College Board encourages test takers to opt into the “Student Search Service,” which enables “accredited colleges, universities, nonprofit scholarship programs, and nonprofit educational organizations” (**cb_opt_in?**) to “license” their contact information. In fall 2021, the College Board Search product both charged \$0.50 per name (The College Board, 2021).

How do universities purchase student lists from College Board Student Search Service and ACT’s Encoura platform? Each purchased list is a subset of prospects drawn from the

population of test-takers by specifying multiple search filters. (schmidt_2019?) states that commonly specified search filters for ACT include high school graduation year, high school GPA, test score range (ACT or PreACT), gender, ethnicity, intended major, and geography (e.g., state, county, zip code) (schmidt_2019?) [CHANGE THIS EXAMPLE TO ACT]. As a hypothetical example, a university could purchase a student list from ACT that consisted of all prospects who scored between 30 and 34 on the ACT, have a GPA higher than 3.5, live in one of the top 10 metropolitan areas, and are in the high school senior class of 2023. As we discuss below, College Board and ACT recently began offering filters that enable universities to target prospects based on statistical models of the past behavior of similar or nearby prospects. [ADD LINKS/APPENDIX FIGURES SHOWING AVAILABLE SEARCH FILTERS FOR CB/ACT?]

What data do purchased student lists contain? Each purchased student list is essentially a spreadsheet that contains one row for each prospect that meets all criteria specified in the purchase. The columns of the student list include detailed contact information (name, address, email, cell phone) and detailed student characteristics derived from the pre-test questionnaire (e.g., ethnicity, race, gender, high school GPA, graduation year, high school code, intended major, first-generation status). The data template for an ACT student list can be found [here](#) and the template for a College Board student list can be found [here](#). These fields represent a small subset of the information the testing agencies know about prospective students and contain little data about performance on assessments (e.g., SAT score). As we discuss below, College Board and ACT provide more detailed information to universities that pay for their enrollment management consulting services.

3 Data Collection and Research Design

This section describes, first, the data collection for the broader project. Second, we describe the research methods for analyses of student list purchases from College Board, which are the focus of this report.

3.1 Data Collection

In 2019 we received funding from the Joyce Foundation and the Kresge Foundation for a research project that would utilize public records requests to collect data about recruiting behavior from all public universities in four states, California, Illinois, Minnesota, and Texas.

Public records requests. We used public records requests to collect data about student lists purchased by public universities. Following several months of planning and pilot requests, we began issuing public records requests in February 2020. We issued one records request letter to each public university in our data collection sample (described below). An example records request letter can be found [here](#). In subsequent communication we narrowed our request to student lists purchased from College Board, ACT, and the National Research Center for College and University Admissions (NRCCUA), the three largest student list vendors at the time.²

For each student list purchased from 2016 through 2020 for the purpose of undergraduate recruiting, we requested two related pieces of data: the order summary, which specifies search criteria for the student list purchase; and the de-identified prospect-level list produced from the search criteria. Figure X shows an example of a College Board order summary.³ In Figure X, the university purchased the contact information of prospects who CRYSTAL ADD TEXT. Figure X shows partial data from the de-identified student list associated with this order. College Board student lists have one observation per prospect and contain variables for contact information (email and physical address), high school code, high school graduating class, demographic information, and selected information about college preferences (e.g., intended major) [CRYSTAL - ADD THESE FIGURES TO MAIN TEXT [order summary data](#), and [de-identified student list data](#)].

Data collection sample. The data collection sample consists of all public universities in IL, MN, CA, and TX. The IL higher education system includes 3 universities in the University of Illinois system, 7 in the Illinois State University system, and 2 in the Southern Illinois University system. In MN, there are 5 universities in the University of Minnesota system and 7 in the Minnesota State University system. In CA, there are 9 universities in the University of California system and 23 in the California State University system. In TX, there are 8 universities in the University of Texas system, 4 in the Texas State University system, 11 in the Texas A&M University system, 4 in the University of Houston system, 2 in the University of North Texas system, 2 in the Texas Tech University system, and 4 independent Texas universities. We also collected data from Arizona State University and Northern Arizona University.

Figures 3 and 4 describe the public universities in our data collection sample. A majority of the universities are master's or doctoral universities and located in urban areas.

²NRCCUA PURCHASED BY ACT AND IN YEAR X ACT RELEASED ENCOURA PRODUCT THAT INTEGRATED NAMES COLLECTED FROM NRCCUA MYCOLLEGE OPTIONS PRODUCT

³Each records request letter also asked for data about off-campus recruiting visits

The Appendix discusses data collection challenges, successes, and lessons learned for future data collection efforts. Appendix Figure X-X reports the status of data collection for each university in the data collection sample.

Figure 3: University by carnegie classification

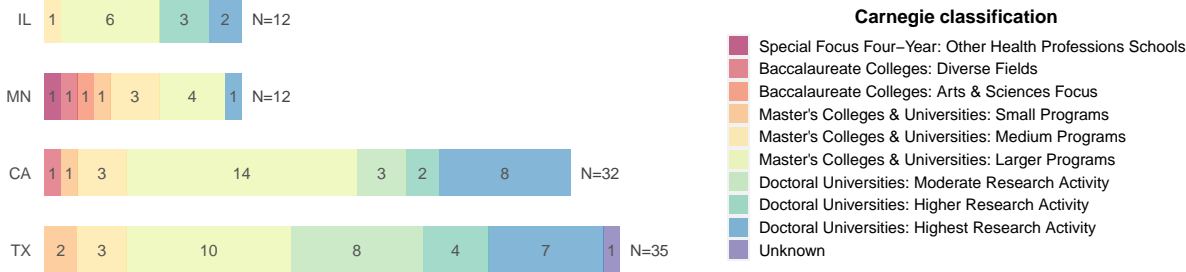
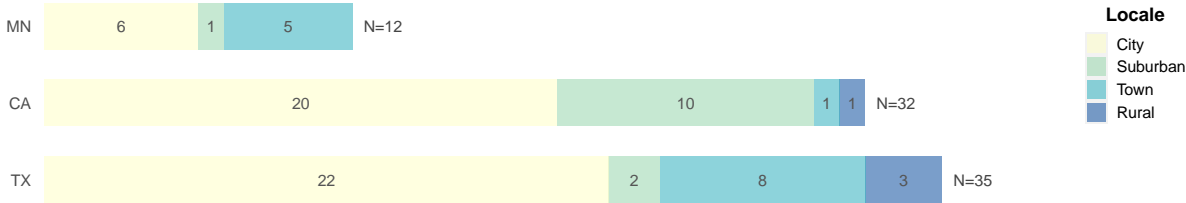


Figure 4: University by locale



Secondary data. Analyses incorporate several secondary data sources. Integrated Postsecondary Education Data System (IPEDS) data provides characteristics of universities in the analysis sample. NCES Common Core of Data (CCD) and Private School Universe Survey (PSS), respectively, provides data about U.S. public and private high schools. The Census American Community Survey (ACS) provide data about community characteristics. We use zip-code level data from ACS 5-year estimates.

3.2 Research Design

Decisions about research design and research questions depended substantially on the results of our data collection.

Analysis sample. This report analyzes student lists purchased from College Board. Table 1 shows the number of public universities in our data collection sample that provided usable data about (1) student list order summaries and (2) de-identified student lists purchased from College Board. [CRYSTAL/KARINA - ARE THESE NUMBERS RIGHT?]. The results presented below are based on data received from 16 universities that provided usable order summary data and usable student list data.

Table 2 summarizes the number of order summaries received and the number of prospects purchased across the 16 universities. We received order summaries for 838 student list purchases, including XXXX purchases where we also received the associated prospect-level student list data and XXXX purchases where we did not receive the associated prospect-level list data.

We received prospect-level student list data for 598 student list purchases, including XXXXX purchases where we also received the associated order summary and XXXXX purchases where we did not receive the order summary. There were XXXX prospects in these 598 student list purchases, including XXXX prospects from purchases where we also received the associated order summary and XXXX prospects from the purchases where we did not receive the associated order summary. [CRYSTAL/KARINA - FILL IN NUMBERS IN TEXT IN THS PARAGRAPH AND ABOVE; ALSO NUMBERS DON'T MATCH BETWEEN TEXT AND TABLE]

Figure 5 shows the number of student lists purchased by Carnegie Classification and state. Figure 6 shows the number of prospects purchased by Carnegie Classification and state.

Figure 7 presents the 838 total orders analyzed in this report by university type and total students purchased. The 838 orders were purchased across 16 universities. The six master's universities in the study made the majority of order purchases (N=307), while research universities made 530 orders and the only baccalaureate university in the study made one order.

The number of total prospects purchased within each order varied widely. Across all 838 orders, the median number of prospects purchased per order was 1,016, whereas the mean was 5,638 (sd=17,696). Despite making fewer total orders than master's universities, research universities on average purchased nearly double the number of students per order (7,542 versus 2,382).

Research questions and analyses. Choices about research questions were informed by data limitations and by substantive considerations. Because we received order summary data and student list data from a non-random sample of universities, we utilize a multiple case

Table 1: Summary of data received

State	# received order summary	# no order summary	# received list	# no list	# received both	# did not receive both
IL	6	6	6	6	6	6
MN	6	6	6	6	6	6
CA	16	16	16	16	16	16
TX	18	17	18	17	18	17

Table 2: Summary of orders and prospects purchased

# orders total	# orders with list	# prospects total	# prospects with order
838	417	3,691,918	3,528,192

Figure 5: Summary of orders purchased by carnegie classification

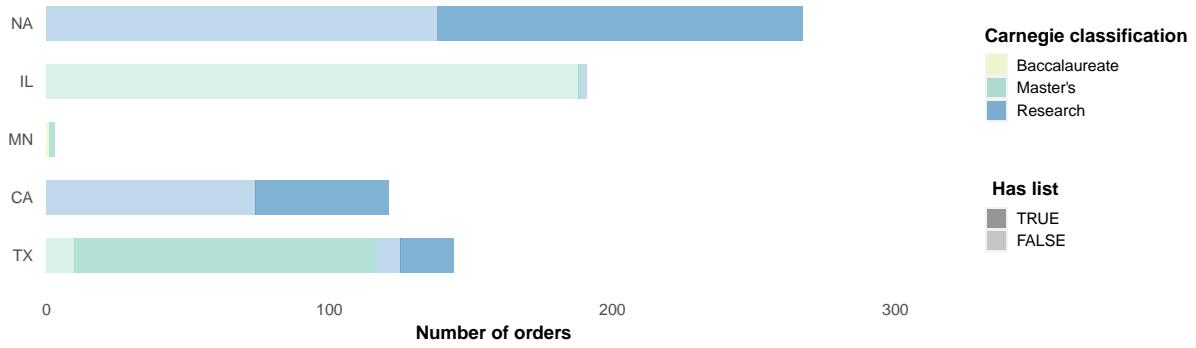


Figure 6: Summary of prospects purchased by carnegie classification

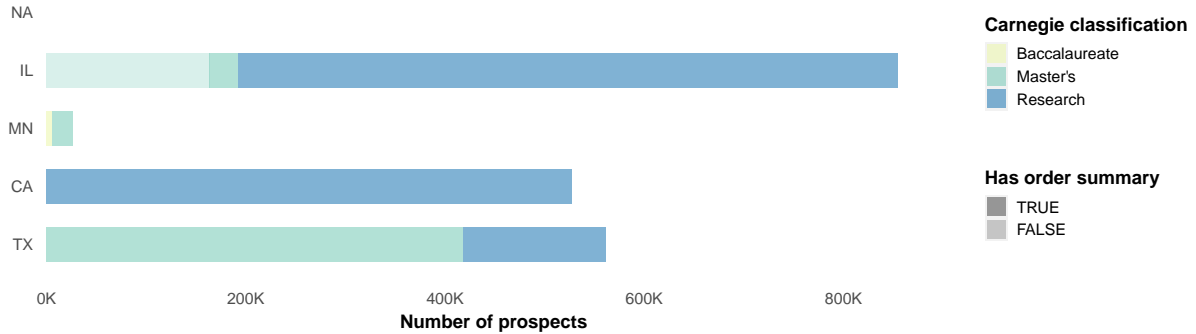
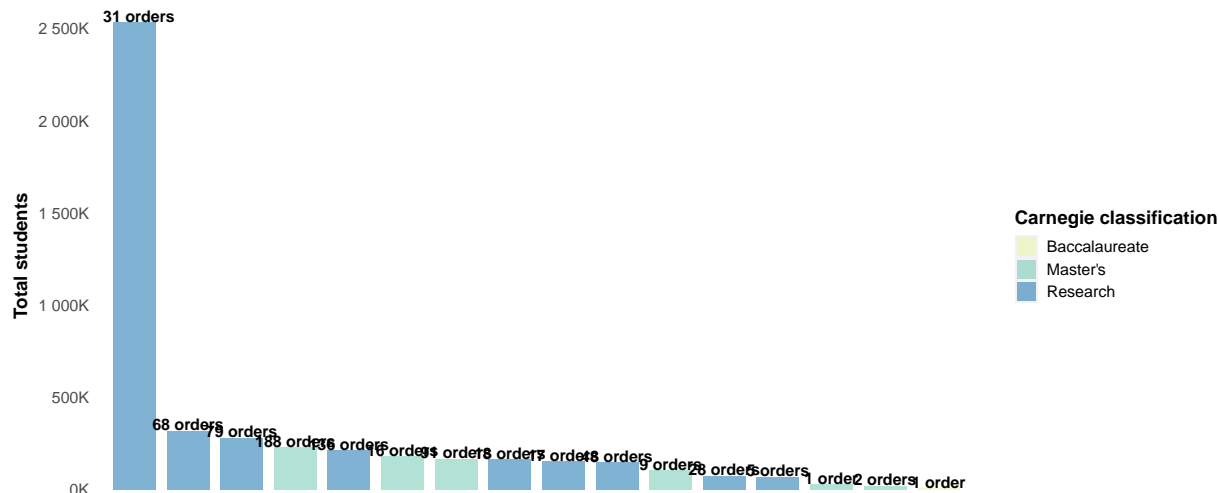


Figure 7: Orders purchased by carnegie classification



study research design (Eisenhardt, 1989) rather than a large-N statistical design. Therefore, our analysis sample identifies behaviors that exist in the population of public universities, but not the prevalence of these behaviors in the population.

More substantively, analyses should also focus on student list products themselves, not just the behavior of customers (universities) who buy the product. Systematic inequality in purchased versus excluded names is a function of: (A) which prospective students are included in the underlying data base; (B) the set of filters that universities can utilize to select prospects; and finally (C) university choices about which filters to select. Therefore, analyses should investigate the relationship between the filters chosen for a particular student list purchase and who is included in the resulting student list.

The empirical analyses presented in this report are guided by three research questions, which focus on student lists purchased from College Board:

1. Which filter criteria were selected in student lists purchased by universities in our sample?
2. What are the characteristics of prospects included in student lists purchased by universities in our sample?
3. What is the relationship between student list filter criteria and the characteristics of purchased prospects?

In RQ1 the unit of analysis is the order or university-order. Analyses allow us to make statements about how orders vary – within-university variation and between-university variation

– for universities in our sample. In RQ2 the unit of analysis is university-prospect. Analyses allow us to make statements about the characteristics of prospects targeted by universities in our sample. In RQ3 the unit of analysis is order-prospect. Analyses allow us to make statements about the relationship between filter criteria and prospect characteristics that extend to lists purchased by any university that select similar filter criteria.

Empirical analyses consist of simple descriptive statistics presented in tables, figures, and maps. For each research question, analyses are anchored by a small set of tables or figures that present results for the entire analysis sample. Next, we present analyses of selected universities, purchases and/or localities that convey commonly observed or thematically important patterns, with a focus on the nexus between race, class, and geography. For RQ2 and RQ3, we contextualize the characteristics of purchased prospects by showing the characteristics of one or more comparison groups (e.g., all high school graduates in the metropolitan area).

4 Results

4.1 RQ1: Filter Criteria Selected in Purchases

Research question 1 asks, which filter criteria were selected in student lists purchased by universities in our sample? We first describe broad patterns in filters used by research vs. ma/doctoral universities. The filters commonly used by universities in our sample can be categorized into three groups: academic (e.g., GPA, PSAT, SAT, academic rank, AP Score); geographic (e.g., zip code, state, segment, core based statistical area, geomarket, international); and demographic (e.g., race/ethnicity, gender). Next, we describe patterns observed, for academic, geographic, and demographic filters, respectively, and how filters are used in combination.

4.1.1 Broad Patterns

Figure 8 shows how often filters were used by university type. Note that student list purchases typically filter on multiple criteria. Figure X shows the prevalence of individual filters, not how often they are used in combination with other filters.

All orders by both research universities ($n = 377$) [CHECK] and ma/doctoral universities ($n = 458$) filtered by high school graduation class. Commonly used academic filters across university type include GPA, SAT, and PSAT. Compared to ma/doctoral universities, research

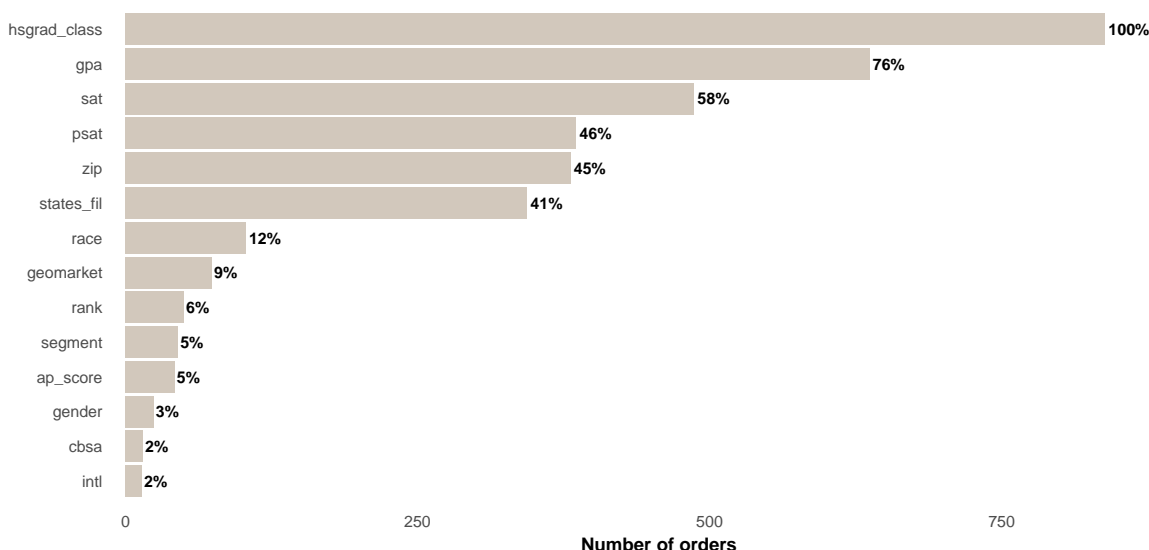
universities were somewhat less likely to filter on GPA or SAT score and more likely to filter on PSAT score. Additionally, research universities filtered on high school class rank (12% of orders) and AP score (10% of orders), but few ma/doctoral orders utilized these filters.

Orders by ma/doctoral versus research universities differed across geographic filters. Nearly 77% of orders by research universities used a state filter but only 11% of orders by ma/doctoral universities filtered for entire states. 83% of orders by ma/doctoral universities used a zip-code filter. However, it is worth noting that most of these orders came from one doctoral university that recruits out-of-state students extensively. By contrast, Research universities in our sample did not use zip code filters. However, research universities also filtered by geomarket (16%), segment (12%), core based statistical area (4%), and international status (4%), whereas ma/doctoral universities generally did not.

Finally, ma/doctoral universities did not utilize demographic filters. For research universities, about 27% of orders filtered by students' race/ethnicity and 6% of orders filtered on gender.

[WHAT ABOUT FILTERS FOR STUDENT PREFERENCES LIKE INTENDED MAJOR, COLLEGE SIZE/TYPE? WERE THESE JUST RARELY UTILIZED OR WE DIDN'T CODE THE DATA? IF THE LATTER, WE SHOULD STATE THIS]

Figure 8: Filters used in order purchases



4.1.2 Academic Filters

The three most commonly used academic filters (GPA, PSAT, SAT) were used by specifying a “low/minimum” and a “high/maximum” threshold. Across university type, nearly all

Table 3: Filter by GPA

GPA	# low	% low	# high	% high
A+	1	0.1%	636	75.9%
A	2	0.2%		
A-	42	5.0%	1	0.1%
B+	24	2.9%		
B	95	11.3%		
B-	263	31.4%		
C+	94	11.2%		
C	15	1.8%		
C-	101	12.1%		

orders that filtered on GPA used a high threshold of “A+.”⁴ However, Figure X shows that research and ma/doctoral universities differed in the specified low threshold for orders filtering by GPA. For research universities, low GPA thresholds ranged from A+ to B-, with the majority of orders using a low of B- (46%) or B (33%). ma/doctoral universities’ orders used low GPA thresholds that ranged from A to C-, with more than half of these orders specifying a low between C- and C+.

Figure X shows minimum and maximum thresholds used in SAT score filters and figure X shows thresholds for PSAT score. Although substantial overlap exists across university type, research universities tended to specify higher minimum score thresholds and higher maximum score thresholds compared to ma/doctoral universities. In Figure X, for example, X% of orders by research universities specified a minimum SAT score of 1110 compared to X% of orders by ma/doctoral. X% of orders by research universities specified a maximum SAT score of 1310 or higher compared to X% of orders by ma/doctoral. Interestingly, 7% of ma/doctoral universities’ SAT filter orders indicated a minimum SAT score threshold of 1500+, whereas research universities made zero orders at that minimum threshold. These 21 orders were made by two different ma/doctoral universities targeting prospects for specific scholarship programs.

4.1.3 Geographic filters

The research universities in our sample used different geographic filters than the ma/doctoral universities in our sample. About 77% of orders by research universities filtered on state. These orders filtered on multiple states or on a single state. Orders that filtered on multiple

⁴The only exception is one order by a research university that used a GPA high of A-

states were used to target out-of-state prospects. The majority of single-state orders were used to target in-state prospects. However, single-state orders to target out-of-state prospects in populous states (e.g., CA) were also common.

Figure X shows orders by research universities that filtered on state, with separate maps for orders that filtered on out-of-state prospects and in-state prospects. CA, TX, and IL were the most commonly filtered states by universities searching for out-of-state prospects. Orders for out-of-state prospects tended to avoid less populous and less affluent states.

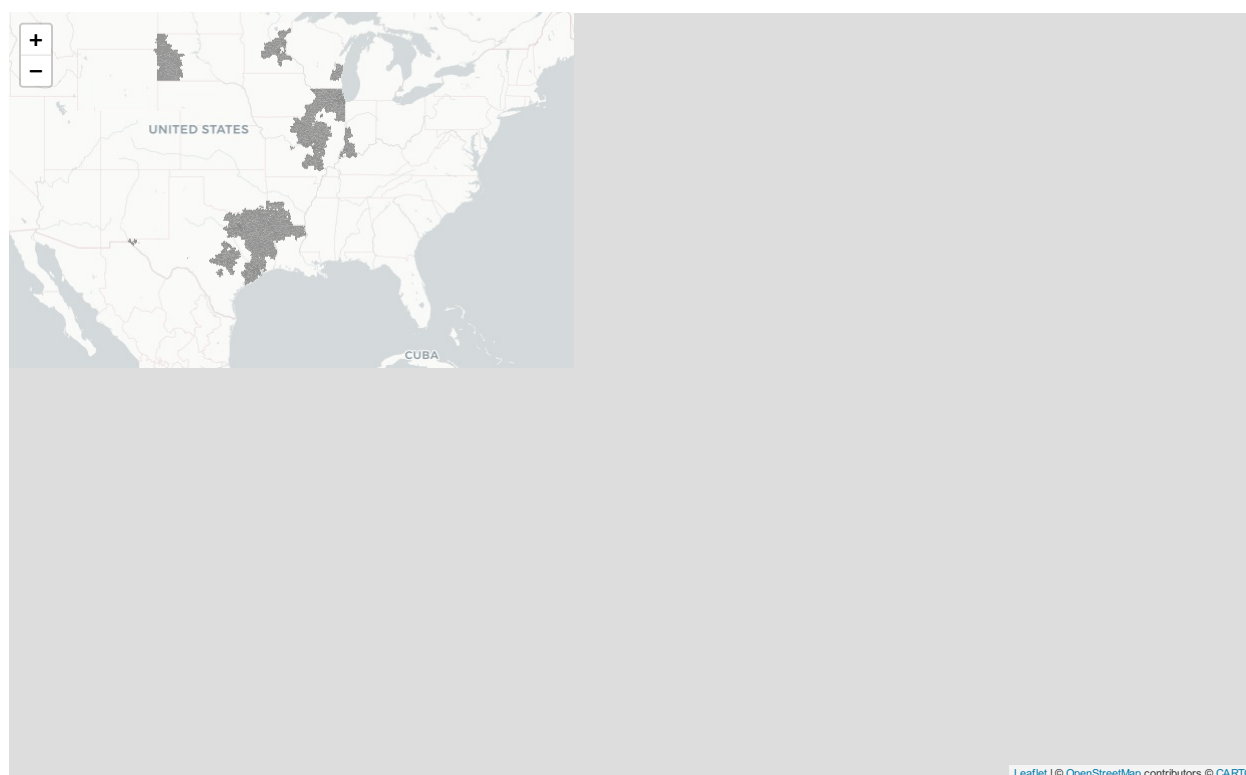
Aside from state, research universities also filtered on other geographic filters created by College Board, including “geomarkets” (16% of orders), “segment” (12% of orders), CBSA (4%), and 4% of order targeted international prospects. Geomarket filters are created by the College Board within their Enrollment Management Services, which use information about SAT score senders from the past five admissions cycles within a specific geographic locality (e.g., counties, metropolitan areas, cities) to make projections about high school graduates in the area [CITE].

Segment filters come from the College Board’s “Segment Analysis Service,” which categorizes each high school and each neighborhood (census tract) into a type based on its demographic, geographic, academic, historical college-going characteristics (The College Board, 2011). Universities can then filter on prospects who attend a particular “type” of high school and/or live in a particular “type” of neighborhood. We analyze Segment orders in more detail in Research Question 3, below.

The geographic filters most commonly used by ma/doctoral universities in our sample were state and home zip code. 11% of orders by ma/doctoral universities filtered on state. These orders [ALWAYS?] were used to target in-state prospects. 83% of orders by ma/doctoral universities filtered on home zip code, but orders by research universities did not filter in zip code.

Zip code filters were used by ma/doctoral universities in two different ways. In the first approach, universities filtered for three-digit zip codes. Three digit zip codes are prefixes for all five-digit zip codes that fall within a postal service sectional center facility, many of which serve large metropolitan areas within one state but can sometimes serve multiple states. XX of XX orders that filtered on zip code filtered on three-digit zip codes. Orders using three-digit zip codes tended to target areas within the state where the university resides and sometimes in neighboring states, which is likely a function of ma/doctoral universities targeting prospective students in their local regions. Figure X shows a map of three-digit zip codes filtered by a TX public university [OZAN SAYS INCLUDE]

Figure 9: Filter by 3-digit zip code



In the second approach, universities specified a list of five-digit zip codes. Usually, five-digit zip codes were specified in a separate spreadsheet or text file that universities provided to College Board. XX (N=381) of XX orders that filtered on zip code filtered on five-digit zip codes. We know the five-digit zip-codes for XXX of these orders. [CAN WE SAY WHETHER THESE TENDED TO BE IN-STATE?]For the remaining XXX orders (n=157 orders), we were unable to obtain the zip-code file despite multiple requests.

One doctoral university gave us order summaries for XXX (?136?) student lists they purchased from College Board in in XXXX (?2019 and 2020). XXX of these orders specified five-digit zip codes. While we were unable to obtain the zip code files, the names on these orders (e.g., ‘Midwest/South II 950-1040 Srs (20),’ ‘West II Srs (20) AP 3-5’) suggests that most of these orders targeted out-of-state five-digit zip codes.

Filtering by geography always raises equality of opportunity concerns for prospects who do not reside in the targeted geography. Filtering by five-digit zip code is particularly concerning because there is no equality of opportunity rationale for targeting students who live in one zip code but not those from a neighboring zip code. Zip codes are highly correlated with income and racial demographics. Therefore, policymakers may be concerned that some universities are systematically excluding low-income communities or communities of color when they

Table 4: Filter by state

University state	Purchased state(s)	Count
AZ	Arizona	84
IL	IL	72
CA	Multi-state	52
CA	CA	41
AZ	CA	37
IL	Multi-state	26
TX	Multi-state	19
TX	TX	9
MN	Multi-state	3
CA	IL	1

filter on five-digit zip code.

4.1.4 Demographic Filters

Nearly all orders using demographic filters were made by research universities. Figure X shows the number of orders that used a race/ethnicity filter. Most of the 103 orders using race/ethnicity filters specified multiple race/ethnicity groups. This includes 19 orders that filtered by Black, Native American, or Latinx prospects and 19 orders that filtered for Asian, Native Hawaiian/Pacific Islander, and White prospects. Other common race/ethnicity filter combinations include Latinx, Black, Native American, and NativeHawaii/PI (11 orders); Asian and White (10 orders); and Latinx and Native American (7 orders). Fewer orders filtered for only one race/ethnicity group, including 12 orders filtering for Latinx prospects, 7 orders filtering for Black prospects, and 10 orders filtering for Native American prospects (American Indian, Alaska Native, and/or Native Hawaiian or Other Pacific Islander) [CLEAN UP SENTENCE NOT ALL OF THESE GROUPS ARE NATIVE AMERICAN. AND NOT CLEAR WHETHER THESE ORDERS FILTERED FOR SPECIFIC GROUP OR FILTERED FOR EITHER].

Research universities also made 24 orders using gender filters. Across these orders, 75% filtered for women prospects and 25% filtered men prospects.

4.1.5 Combination of Filters

On average, the (N=XXX) orders in our dataset specified X.X criteria. Table 5 shows the ten most commonly used combinations of filters across orders by research (N=377) and

Table 5: Filter combos used in order purchases

Filters	Count	Percent
grad_class,zip,sat,gpa	206	25%
grad_class,zip,psat,gpa	145	17%
grad_class,state,sat	67	8%
grad_class,state,psat	49	6%
grad_class,state,race,sat,psat,gpa,rank	39	5%
grad_class,state,sat,gpa	31	4%
grad_class,zip,sat,psat,gpa	28	3%
grad_class,sat,geomarket	26	3%
grad_class,psat,geomarket	23	3%
grad_class,state,race,psat,gpa	22	3%

ma/doctoral (N=458). [STATE SOMEWHERE THAT SOME FILTER IN THESE COMBINATIONS ARE USED AS **OR** CONDITIONS RATHER THAN **AND** CONDITIONS?].

For research universities, the top ten filter combinations account for 71% of all orders. The most common filter combination used included high school graduation class, state, and PSAT scores (n=47). These filters were also used across the top three combinations. For 41 [NUMBERS SEEM OFF IN PARAGRAH?] orders, high school graduation class, state, and PSAT scores were combined with race and gpa filters. Another 39 orders added race, gpa, SAT, and high school rank. The fourth and fifth most common combinations switched PSAT scores for SAT scores. The remaining common filter combinations across orders by research universities used other academic filters (e.g., high school rank, AP scores) and geographical filters (e.g., geomarkets, segment).

For ma/doctoral universities, the top 10 filter combinations account for 97% of all orders. This is a function of nearly half of all orders using a combination of high school graduation class, zip, SAT scores, and GPA to filter prospect lists. Another 32% of orders used these same filters but used PSAT scores rather than SAT scores. Other orders by ma/doctoral universities used similar patterns of filters by using all three top academic filters together (PSAT, SAT, and GPA) or switching zip codes for a state filter.

The results for Research Question 3 investigates the student characteristics associated with particular combinations of filters.

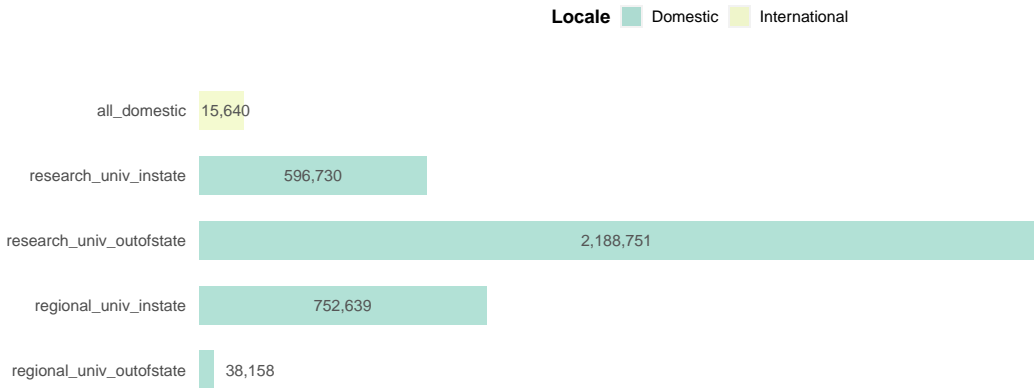
4.2 RQ2: Characteristics of Prospects

Research Question 2 asks, What are the characteristics of prospects included in student lists purchased by universities in our sample? Our analysis on the characteristics of prospects purchased by universities includes 598 orders resulting in 3,691,918 prospects. Figure 10 shows the total number of prospects by public versus ma/doctoral universities, focusing on domestic students. Research universities in the study purchased nearly four times the number of prospects ($N = 2,785,481$) than ma/doctoral universities ($N = 764,334$).

Figure 10 also shows the number of prospects purchased by in-state versus out-of-state across institutional type. Research universities purchased many more out-of-state students than ma/doctoral universities. For example, of the nearly 2.8 Million prospects purchased by research universities, 79% were out-of-state. In comparison, only 5% of ma/doctoral universities nearly 791,000 prospects were out-of-state students.

Below we describe the racial, economic, and geographical characteristics of prospect lists purchased by research and ma/doctoral universities.

Figure 10: Number of prospects purchased



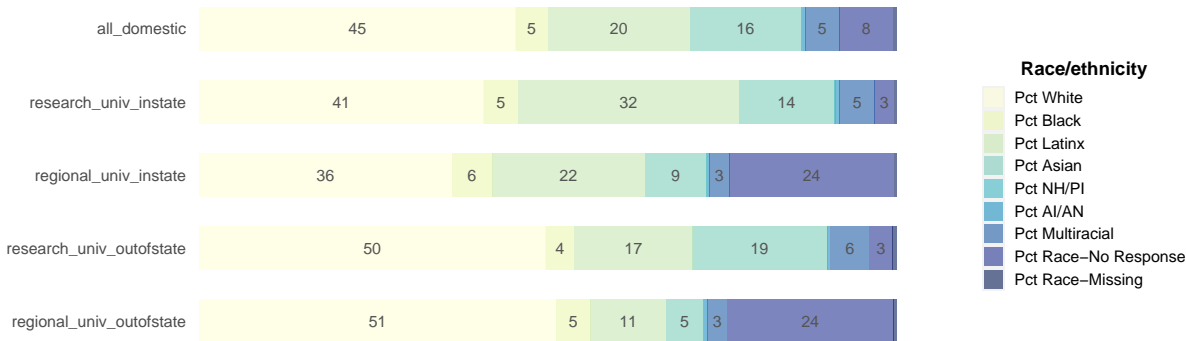
4.2.1 Public Research Universities

Figure 11 presents the racial characteristics of prospects from lists purchased by research university across in-state versus out-of-state status. Race/ethnicity of prospects is collected from the College Board's voluntary demographic questionnaire completed by students when taking the SAT; therefore, we report racial characteristics as self-identified and include the percentage of students that did not report their race/ethnicity.

Out-of-state prospects in lists purchased by research universities had a larger proportion of White and Asian students and lower proportions of Black, Latinx, and Native American students than lists for in-state prospects. For example, when research universities in the study made order purchases for prospects residing in different states than where their campus is located, these lists resulted in prospect lists made up of 50% White students, 19% Asian students, 17% Latinx students, 4% Black, 6% multiracial, and 4% no response. In comparison, purchases for prospects residing in the same state as the institution’s campus results in lists made up of 38% White students, 11% Asian, 26% Latinx, 5% Black, 4% multiracial, and 14% of students that did not report their race/ethnicity.

Figure 12 presents the average median income of the zip code where in-state versus out-of-state prospects live for lists purchased by research universities. The figure shows out-of-state prospects tend to be more affluent than in-state prospects. For example, when research universities in the study purchased lists for prospects residing in different states than where their campus is located, these lists resulted in prospects that live in areas where the average median household income is \$98,000. In comparison, purchases for prospects residing in the same state as the institution’s campus resulted in prospects that live in areas where the average median household income is \$85,000.

Figure 11: Prospects purchased by race



We also analyze the urbanicity characteristics of prospects in list purchased by research universities. Figure X shows...

4.2.2 Public ma/doctoral Universities

Figure 11 presents the racial characteristics of prospects from lists purchased by ma/doctoral university across in-state versus out-of-state status. Similar to research universities, a greater

proportion of out-of-state prospects in lists purchased by ma/doctoral universities were White (43%) relative to in-state prospects (35%), although greater number of prospects in lists purchased by ma/doctoral universities did not report their race/ethnicity. While disparities for Asian, Black, and Native American prospects across out-of-state versus in-state list purchases by were not as large relative to research universities, out-of-state prospects in lists purchased by ma/doctoral universities included a much lower percentage of Latinx students (9%) than in-state lists (22%).

Contrary to prospect characteristics in lists purchased by research universities, out-of-state prospects in lists purchased by ma/doctoral universities on average live in less affluent areas than in-state prospects. However, the magnitude in differences across median average household incomes is smaller across purchased for ma/doctoral universities. For example, Figure 12 shows out-of-state prospects live in areas where the average median household income is \$98,000 in comparison to \$85,000 for in-state prospects.

Figure 12: Prospects purchased by income



We also analyze the urbanicity characteristics of prospects in list purchased by research universities. Figure X shows...

4.3 Filter Criteria and Characteristics of Prospects

We analyze the relationship between filter criteria and the characteristics of purchased prospects in two different ways. First, we analyze prospect characteristics (e.g., race/ethnicity, income, in-state versus out-of-state) across individual filters to understand broad patterns. Second, we analyze prospect characteristics across common combinations of filters. Here we use selected universities, purchases and/or localities that convey commonly

Table 6: Characteristics of prospects by filters

	All domestic	GPA	PSAT	SAT	HS rank	Race	Gender	Zip code	State	Segment	CBSA
Total N	3,576,278	1,129,129	1,833,369	971,237	971,237	306,209	39,546	165,924	1,200,141	186,519	146,313
Pct Race-No Response	8	3	3	3	3	2	3	4	3	3	3
Pct AI/AN	0	1	1	0	0	2	0	1	1	0	0
Pct Asian	16	15	17	15	15	9	38	13	18	27	28
Pct Black	5	7	4	7	7	10	1	8	5	3	2
Pct Latinx	20	23	19	22	22	43	6	27	24	11	8
Pct NH/PI	0	0	0	0	0	0	0	0	0	0	0
Pct White	45	45	50	47	47	27	47	43	43	51	53
Pct Multiracial	5	5	5	5	5	8	5	4	5	5	5
Median Household Income (mean)	93,505	91,746	95,007	92,251	92,251	85,047	110,587	87,861	92,184	113,165	117,222
Pct In-State	38	62	30	54	54	54	6	98	48	15	4
Pct Out-of-State	62	38	70	46	46	46	94	2	52	85	96
Pct Private	10	8	11	8	8	10	9	7	10	11	14
Pct Public	84	86	84	87	87	84	86	85	85	85	82
Pct School Unknown	5	5	5	5	5	6	4	9	5	3	4

observed or thematically important patterns across combinations of filters. We also contextualize the characteristics of purchased prospects by showing the characteristics of one or more comparison groups based on the selected examples.

4.3.1 Prospect Characteristics Across Individual Filters

Table 6 presents the characteristics of prospects by individual filters. For each column, averages are reported across all prospects that were purchased via orders using the specified column filter, which includes orders that used the specified filter in combination with other filters.⁵

Focusing on the racial characteristics of prospects, student lists with the largest percentages of White and Asian prospects result when orders use PSAT, gender, segment, or CBSA filters. For example, orders that specify a gender filter result in prospect lists that are less than 10% Black, Latinx, and/or Native American. This pattern is consistent in prospect lists that use segment or CBSA filters, although the disparity is not as large for orders using a PSAT filter (24% Black, Latinx, Native America). On the other hand, orders that filter by specifying particular race/ethnicity groups result in lists that have fewer White and Asian prospects and greater proportions of Black, Latinx, Native American, and multiracial prospects. This coincides with descriptive findings above that suggest more than half of all orders using a race/ethnicity filter specified Black, Native American, and/or Latinx prospects.

Similar disparities are evident across the economic characteristics of prospect lists by filters used. Orders using PSAT, gender, segment, or CBSA filters result in prospect lists with the largest average median household incomes. Orders using a CBSA filter showcase the upper

⁵Given we present all prospects across individual filters that are used in combination with others, total number of prospects summed across columns will exceed our grand total of 3,691,918 prospects

extreme of this pattern, resulting in lists where the average prospect lived in a zipcode where the median household income \$117,000. Similarly, orders using race/ethnicity filters showcased the lower extreme. When universities purchased orders that filtered for specific race/ethnicity groups, the resulting lists included prospects that lived in zip codes where the average median household income was less than \$85,000.

Not surprisingly, orders using geographic filters result in specific patterns of in-state versus out-of-state prospects. However, analyzing the residency status of prospect lists across filters can help us develop insights into how specific filters are used to target prospects geographically. For example, orders using segment and CBSA filters are likely used for targeting out-of-state students, as the use of these filters result in prospect lists made up of 85% and 96% out-of-state prospects, respectively. However, orders filtering for prospects within specific state(s) result in list that are nearly equal proportions of out-of-state and in-state students. Coinciding with descriptive statistics detailed above and data limitations (i.e., we only received zip codes used to filter order lists by two master’s universities in our sample), nearly 98% of prospects resulting from orders using a zip code filter were in-state students. Similar to disparities in racial and economic characteristics of prospects, orders using a gender filter also resulted in geographical disparities (94% out-of-state versus 6% in-state).

Lastly, Table 6 shows the difference in proportions of prospects that attend public versus private schools does not change significantly across filters used. For example, orders that specify a CBSA result in student lists where on average 14% of prospects attend private schools, which is the maximum proportion across all filters. In comparison, orders that use zip code filter result in students lists with the minimum proportion of prospects attending private schools (7%).

4.3.2 Prospect Characteristics Across Combinations of Filters

4.3.3 ma/doctoral Zip Codes & Test Scores

We begin analyzing the characteristics of prospects across some of the most common combination of filters. Many of the orders in our analysis filtered by high school graduation class, PSAT scores, GPA, and zip code. Figure 9 and analyses above suggest orders using this combination of filters were made by master’s universities to identify in-state and ma/doctoral prospects. We “zoom” into orders by one of these master’s universities, Texas A & M University- Texarkana, in order analyze in-depth patterns in the racial and economic characteristics of prospects that result from this combination of filters.

Texas A & M University- Texarkana made 65 orders using graduation class, PSAT scores, GPA, and zip code filters. These orders targeted 2019-2022 high school graduating classes with minimum PSAT scores ranging from 920-1300 and maximum SAT scores ranging from 970-1450. The university also filtered for prospects with GPAs ranging from a low of C+ to a high of A+. Lastly, prospects were also filtered using a series of 3-digit zip codes that included both in-state and neighboring state zip codes.

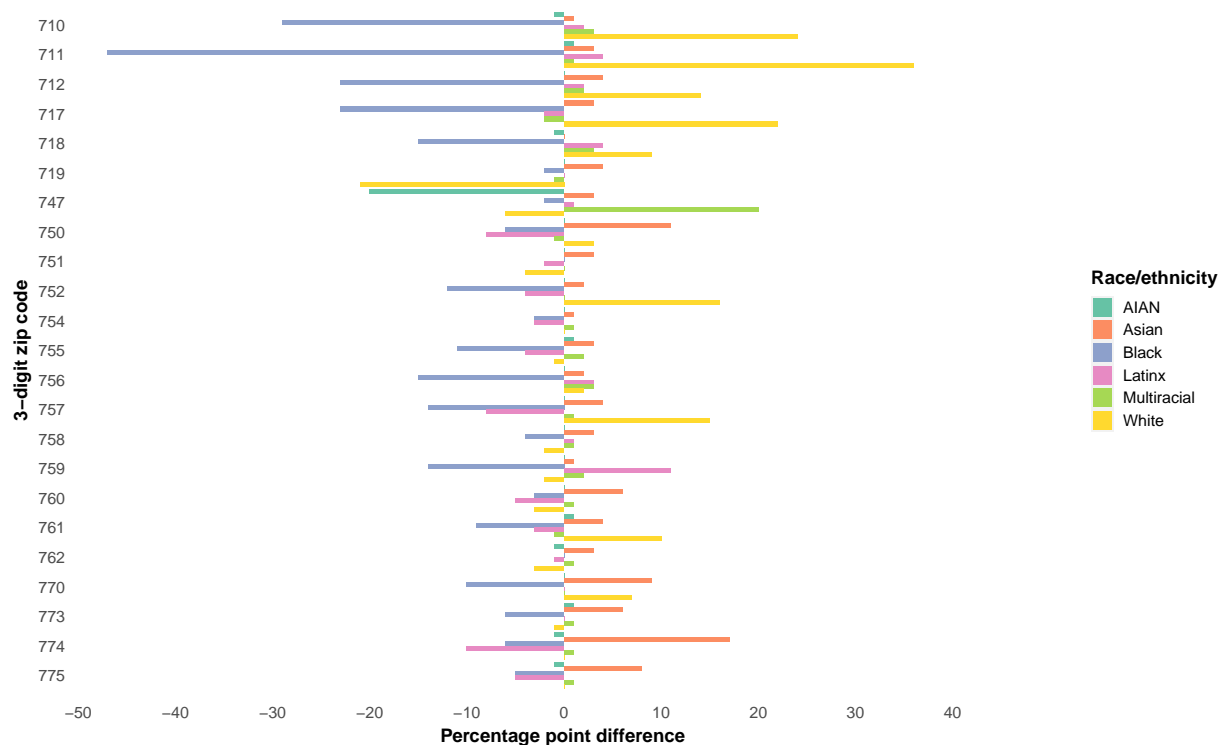
For each three-digit zip code used as an order filter, we compare the average racial and economic characteristics of the resulting purchased prospects to the zip code's population of 15-19 year-olds. We select the zip code population as the comparison group for purchase prospects filtered by graduation class, PSAT scores, GPA, and zip code filters for various reasons. First, the university included a three-digit zip code filter which encapsulates all students living within in a specified area (usually a City or County), which should hypothetically cast a wider, more equitable net than filtering explicitly by 5-digit zip codes. However, we analyze whether this wider net is compromised when it is used along with test scores and GPA. Secondly, master's universities are like to serve ma/doctoral student markets, rather than the entire state where they are located. Therefore, we use a filtered zip code's population as a comparison group for prospects purchased within that zip code rather than all zip codes in the state from which prospects were not purchased from.

For example, the three-digit zip code 752 was included in 27 of the 65 orders that filtered across graduation class, PSAT scores, GPA and zip code. The 49 five-digit zip codes nested within the three-digit 752 zip code includes communities across the Dallas metropolitan area (see Figure X). The student lists for these orders resulted in 8,707 purchased prospects living in one of the 47 five-digit zip codes. About 40% of purchased prospects identified as White, 39% as Latinx, 8% Black, 5% Asian, and 3% multiracial. In comparison, the population of 15-19 year olds in these 49 five-digit zip codes are 24% White, 43% Hispanic, 20% Black, 3% Asian, and 3% multiracial.

Figure 13 presents the average percentage point difference between the racial/ethnic composition of students lists and of the 15-19 year old population across all zip codes filtered by the master's university in this analysis. For example, Zip Code 752 in Figure 13 shows a 16 percentage point difference between White prospects purchased living in the zip code and the overall percentage of White 15-19 year olds living in the zip code ($40\% - 24\% = 16$ percentage points), suggesting White prospects are overrepresented in purchased lists relative to the population of their home zip code. Similarly, the figure shows a -12 percentage point difference between the Black prospects purchased from the zip code and the percentage of Black 15-19 year olds living in the zip code ($8\% - 20\% = -12$ percentage points), suggesting

Black prospects are underrepresented in purchased lists relative to the population of their home zip code.

Figure 13: Texas A&M purchases by zip code and race



Overall, Figure 13 suggests prospect lists from orders that filtered using graduation class, PSAT scores, GPA, and zip code tend to be more White and Asian and less Black and Latinx relative to the population of 15-19 year olds from zip codes filtered by. The overrepresentation of White prospects in comparison to zip code populations ranged from 2 to 36 percentage points for 11 of the 23 zip codes filtered by, whereas three zip codes had proportional representation (0 percentage point difference). The remaining 9 zip codes had an underrepresentation of White prospects, where eight orders ranged from 1 to 6 percentage points and one order had -21 percentage points. The overrepresentation of Asian prospects purchased across the 23 zip codes ranged from 1 to 17 percentage points.

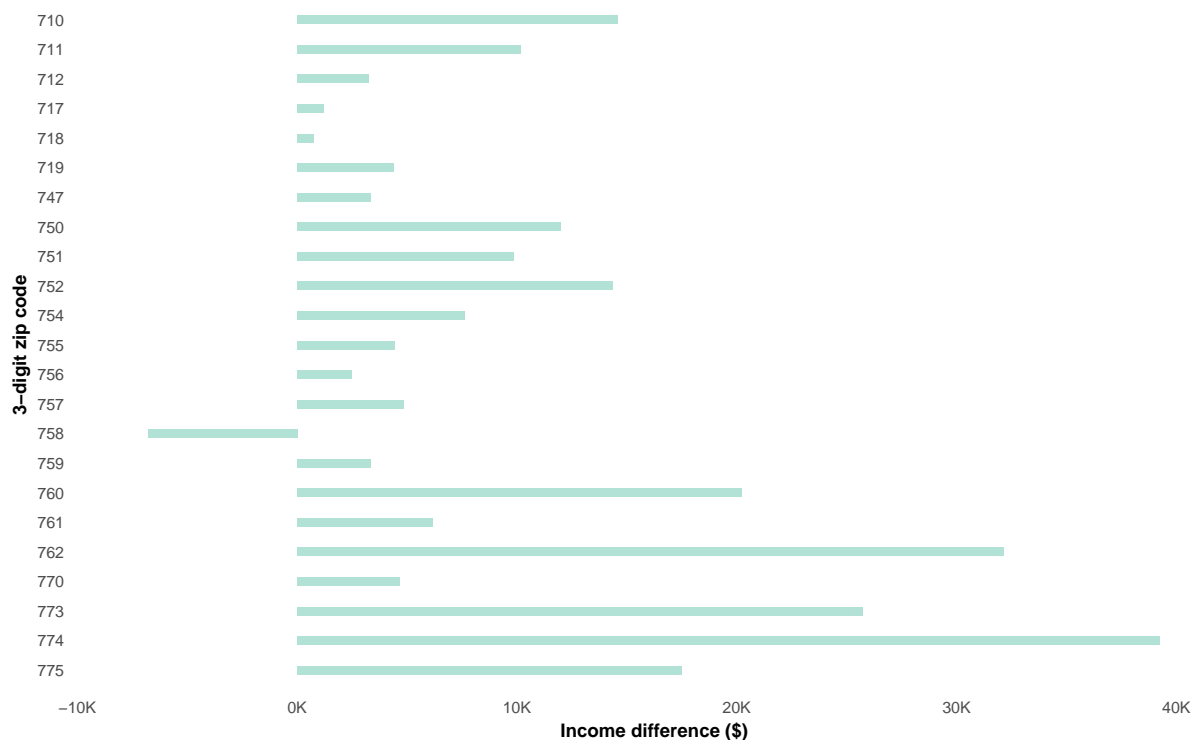
Black prospects were underrepresented relative to zip code populations across all zip codes used and in the greatest magnitude across all racial/ethnic groups. The underrepresentation of Black prospects purchased across the 23 zip codes ranged from 2 to 47 percentage points. Latinx students were also underrepresented across 12 of the 23 zip codes, although the magnitude was not as large as (ranging from 1 to 10 percentage points). Three of the zip codes filtered by had proportional representation of Latinx students (0 percentage point

difference), whereas the remaining zip codes had an overrepresentation ranging from 1 to 4 percentage points.

Economic disparities are also evident when we compare the average median income of prospects relative to the average median household of the zip code population. Figure 14 presents the difference in average median household income between prospects (measured at the 5-digit zip code level) and the average median household income across all nested 5-digit zip codes within the 3-digit filters used. Because both prospects' and population income is measured at the zip code level across 5- versus 3-digits, a disparity indicates more prospects living in affluent 5-digit zip codes were purchased than the average median household income across all 5-digit codes within the 3-digit filter.

Figure 14 shows student lists resulting from 22 of the 23 zip code filters included more affluent prospects than the average population of those zip codes. This disparity was largest for prospects purchased from 774 zip codes (communities within Richmond, Texas), which had an average median income nearly \$40,000 greater than the average median income of the population across all nested 774 zip codes. Prospects purchased from 758 zip codes (communities within Palestine, Texas) were the only across all filters to have an average median income less than the population across all nested zip codes (\$43,000 versus \$50,000).

Figure 14: Texas A&M purchases by zip code and income



4.3.4 CBSA, Segment, and Test Scores

Segment filters come from the College Board’s “Segment Analysis Service” which merges demographic, geographic, and academic data on SAT test takers to create “geodemographic profiles” for college-bound students (The College Board, 2011, p. 3) based on where they live and attend high school. Profiles are created at the neighborhood and school-level, which are then categorized into “clusters” based on similarities across profiles. Figures 7 and 8 show all possible neighborhood and high school clusters that can be used as segment filters to purchase student lists.

The 45 orders using segment filters were made by three public research universities in the sample. For example, one of these universities made 21 of the 45 orders using the same patterns of segments. These 21 orders filtered for 10 different neighborhood clusters (51, 53, 58, 60, 61, 63, 69, 70, 73, and 78), which are highlighted in Figure X. Using average characteristics of neighborhood clusters calculated and advertised by the College Board (and presented in Figure X), the filtered neighborhoods range from median household incomes between \$68,213 to \$134,400 and range from 19% to 87% non-white. Orders also filtered by high school segment clusters 58, 63, 64, 65, 66, 68, 69, 70, 73, 75, and 79. Figure X shows these high schools range from average SAT mathematics scores between 390 to 606 and previous cohorts in these schools on average ranged from 32% to 74% in going out of state for college.

Other common combinations of filters were used by research universities in the study to target out-of-state prospects. Some of these orders filtered by graduation class, state, CBSA, segment, SAT or PSAT, and GPA. We “zoom” into orders by The University of Illinois at Urbana-Champaign in order to analyze in-depth patterns in the racial and economic characteristics of prospects that result from this combination of filters.

The University of Illinois at Urbana-Champaign made eight orders using graduation class, state, CBSA, segment, SAT or PSAT, and GPA. These orders targeted 2019-2023 high school graduating classes with minimum PSAT/SAT scores ranging from 1220-1240 and maximum PSAT/SAT scores of 1450. The university also filtered for prospects with GPAs ranging from a low of B- to a high of A+. Prospects were also geographically filtered across State/CBSAs and segments. For States/CBSA, the university filtered across some of the largest, most populated metropolitan areas of the country (including but not limited to Atlanta, New York, Philadelphia, Boston, Washington D.C., Detroit, Phoenix, Miami, Orlando, Baltimore, Denver, Raleigh). As described above, segment filters across orders used both neighborhood and high school clusters. These eight orders filtered for neighborhood clusters 51 (with all

Table 7: Filter by neighborhood segments

2011 D+ Cluster	SAT Math	SAT CR	Going Out of State	Percent NonWhite	Need Financial Aid	Med Income
51	546	533	32%	30%	57%	\$95,432
52	480	470	30%	58%	71%	\$63,578
53	561	544	32%	50%	55%	\$92,581
54	458	443	25%	83%	76%	\$38,977
55	566	565	52%	24%	63%	\$71,576
56	420	411	29%	93%	66%	\$35,308
57	541	519	52%	47%	43%	\$67,394
58	533	489	28%	87%	69%	\$68,213
59	561	562	52%	24%	74%	\$54,750
60	589	590	63%	37%	36%	\$104,174
61	585	567	51%	30%	40%	\$123,858
62	596	595	67%	24%	72%	\$59,824
63	548	541	39%	23%	65%	\$69,347
64	466	466	48%	34%	29%	\$49,829
65	440	433	23%	93%	78%	\$45,081
66	499	492	20%	12%	76%	\$50,453
67	519	501	27%	53%	59%	\$60,960
68	552	558	52%	35%	65%	\$57,902
69	534	521	37%	19%	65%	\$88,100
70	613	598	65%	29%	61%	\$86,381
71	405	408	39%	97%	68%	\$42,661
72	399	397	31%	87%	47%	\$32,708
73	528	514	29%	42%	62%	\$90,849
74	433	435	29%	84%	79%	\$44,065
75	459	457	28%	85%	72%	\$50,421
76	514	509	27%	38%	64%	\$61,332
77	502	492	26%	18%	75%	\$62,372
78	594	578	56%	26%	39%	\$134,400
79	550	551	57%	32%	74%	\$40,909
80	534	527	39%	39%	65%	\$49,877
81	491	483	27%	57%	72%	\$63,030
82	496	491	29%	21%	75%	\$53,465
83	500	490	19%	26%	71%	\$49,335
Total	512	502	32%	43%	65%	\$70,231

Table 8: Filter by high school segments

2011 D+ Cluster	SAT Math	SAT CR	Going Out of State	Percent NonWhite	Need Financial Aid	Med Income
51	462	457	14%	33%	68%	\$40,918
52	489	496	81%	99%	77%	\$64,730
53	471	484	28%	38%	62%	\$60,833
54	376	371	33%	96%	38%	\$38,146
55	489	481	39%	46%	44%	\$71,845
56	536	508	73%	43%	49%	\$63,967
57	434	435	29%	82%	79%	\$48,301
58	592	577	51%	27%	32%	\$104,509
59	499	489	19%	18%	74%	\$47,685
60	523	549	23%	30%	33%	\$70,175
61	485	370	33%	89%	9%	\$61,385
62	474	473	34%	92%	67%	\$55,515
63	440	427	28%	86%	72%	\$49,238
64	606	542	37%	89%	57%	\$81,911
65	515	503	28%	43%	65%	\$72,692
66	498	515	37%	37%	73%	\$60,272
67	526	546	48%	41%	69%	\$71,279
68	541	540	41%	26%	62%	\$79,260
69	390	395	36%	92%	74%	\$43,391
70	595	581	56%	33%	48%	\$105,721
71	400	412	57%	98%	80%	\$43,137
72	528	544	35%	25%	64%	\$70,018
73	451	438	24%	89%	76%	\$48,406
74	654	579	76%	80%	46%	\$59,089
75	514	502	31%	20%	71%	\$72,850
76	600	584	72%	50%	28%	\$90,265
77	595	508	64%	75%	39%	\$39,490
78	473	468	48%	43%	22%	\$56,703
79	594	585	61%	26%	71%	\$65,180
Total	514	502	32%	44%	65%	\$70,223

high school clusters), 53 (with high school cluster 70), 58 (all high schools), 60 (with high school clusters 65,70,79), 61 (with high school cluster 65), 63 (with high school clusters 68, 70), 69 (with high school clusters 65, 79), 70 (with high school clusters 65, 68, 70, 75), 73 (with all high schools), 78 (with high school cluster 66). Orders also included all high school categorized under high school cluster 79.

We analyze orders by the University of Illinois at Urbana-Champaign that use these filters across several metropolitan areas by comparing the average racial and economic characteristics of the resulting purchased prospects to the metropolitan areas' overall population' of public high school students. We select the population of public high school students within the metropolitan area as a comparison group for several reasons. First, similar to our analysis of zip code filters above, the university included entire metropolitan areas as filters that should hypothetically provide an equitable opportunity for all prospects living in the area to be included in student lists purchased by the university. However, the combination of segment and additional academic filters may result in disparities across which prospects are included in comparison to the average population of the metropolitan area.

Figure 15 shows the racial/ethnic characteristics of purchased prospects versus the population of students attending public high schools in three metropolitan areas that were included across all eight orders by the University of Illinois at Urbana-Champaign using graduating class, state, CBSA, segment, SAT or PSAT, and GPA filters. For example, the top panel shows the resulting student lists for University of Illinois at Urbana-Champaign that targeted prospects within the Los Angeles metropolitan area using these filters. The brown bars indicate the students lists for these orders resulted in 18,420 purchased prospects living in the metropolitan area. About 30% of purchased prospects identified as White, 49% as Asian, 1% as Black, 9% as Latinx, and 7% as multiracial. In comparison, the blue bars in the figure indicate the population of public high school students in the Los Angeles metropolitan area are 18% White, 13% Asian, 6% Black, 60% Latinx, and 3% Multiracial.

Across orders using graduation class, segment, SAT or PSAT, and GPA filters within the Los Angeles, Philadelphia, and New York Metropolitan areas, prospect lists resulted in higher percentages of White and Asian students relative to the population of public high school students within each metropolitan area. The overrepresentation of White prospects in student lists relative to the population of public high school students ranged from 12 to 17 percentage points across the three metropolitan areas. Purchased prospects within the Los Angeles metropolitan areas exemplified the largest disparity for Asian students, with 49% of purchased prospects identifying as Asian relative to the 13% of public high school students identifying as Asian within the metropolitan area (a 36 percentage point difference).

Figure 15: Metro area purchases by race

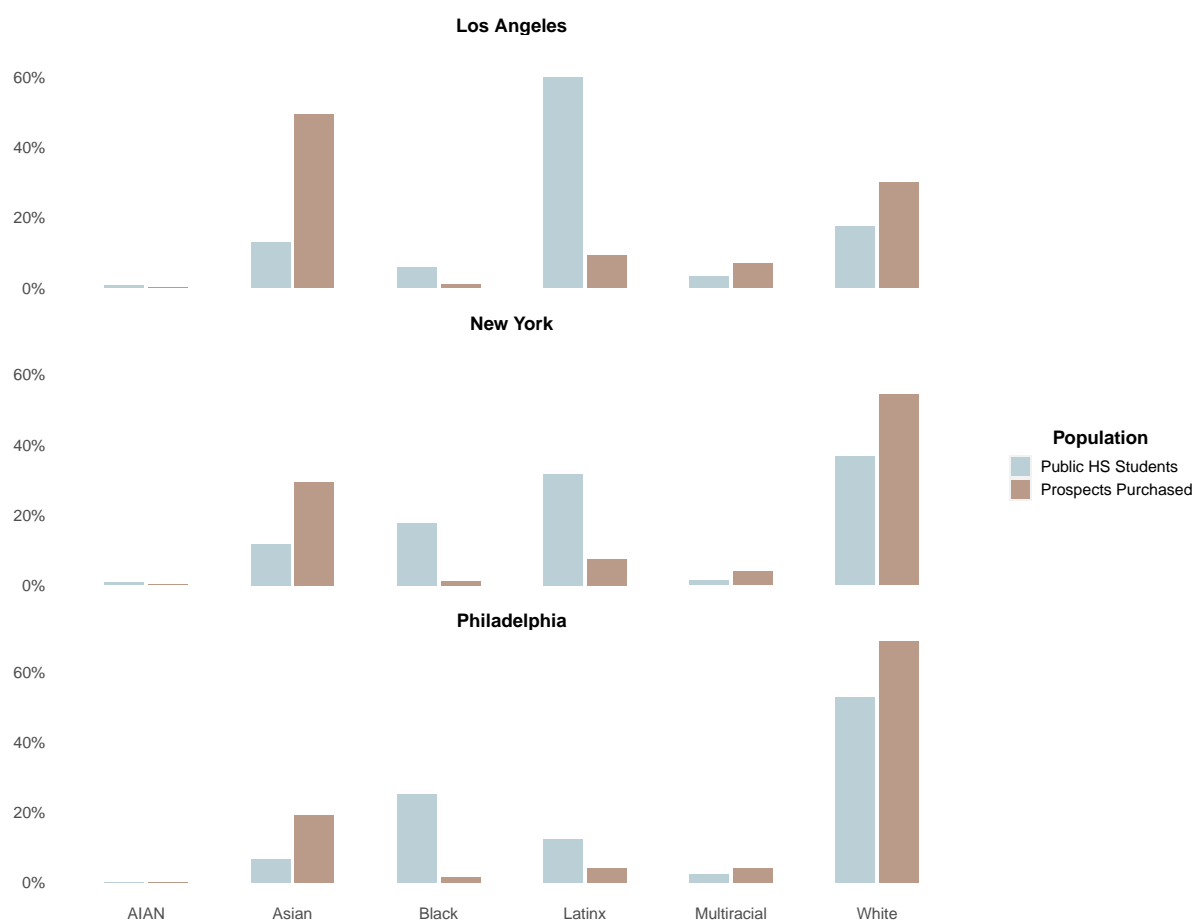


Figure 15 shows Black and Latinx prospects were underrepresented relative to public school students across all three metropolitan areas. Orders made within the Philadelphia metropolitan area exemplify the largest magnitude in this disparity for Black students, with Black students making up less than 2% of purchased prospects while making up more than 25% of all public high school students in the metropolitan area. The underrepresentation of Black prospects in comparison to public high school students was 16 percentage points for the New York and 3 percentage points for the Los Angeles metropolitan areas. On the other hand, the Los Angeles metropolitan area exemplified the largest disparity for Latinx students (9% Latinx purchased prospects versus 60% Latinx public high school students). The underrepresentation of Latinx prospects in comparison to public high school students was 8 percentage points for the Philadelphia and 24 percentage points for the New York metropolitan areas.

Figure 16: Metro area purchases by income

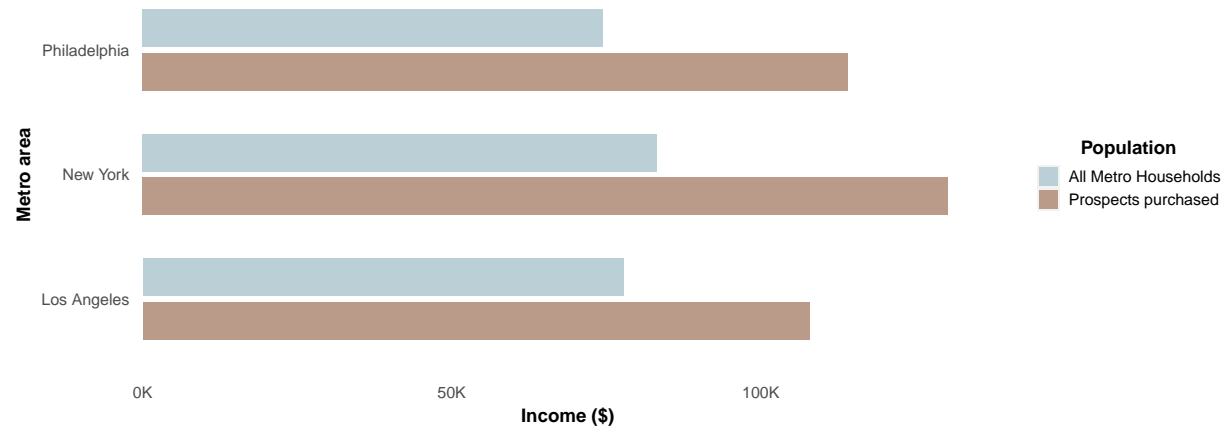


Figure 16 presents the average median household income of purchased prospects (taken at the 5-digit zip code level) in comparison to the median household income of the entire metropolitan area. For example, the median income across all households in the Philadelphia metropolitan area is \$75,000, whereas prospects living within the metropolitan area purchased by the University of Illinois at Urbana-Champaign had an average median household income of \$114,000. Prospects purchased tended to have higher median average household incomes than the average across all households within the Los Angeles and New York metropolitan areas also. The difference was nearly \$50,000 for New York and \$30,000 for Los Angeles.

4.3.5 Women in STEM

Two of the research universities in the study made orders targeting prospective students who are women interested in science, technology, engineering, and math (STEM). These orders targeted women interested in STEM primarily through two different filter patterns. The first pattern used SAT scores (ranging from 1300 to 1600), GPA (ranging from a low of B and high of A+), a state filter (in-state versus out-of-state), and students' self-reported intended major. The second pattern also used the same SAT, GPA, and state filters, but STEM interest was proxied via AP test scores. For in-state prospective students, orders filtered for prospects scoring from 3 to 5 on AP STEM tests. For out-of-state prospective students, orders filtered for prospects scoring 4 or 5 on AP STEM tests.⁶

In order to analyze in-depth patterns in the racial and economic characteristics of prospects that result from the combination of achievement, geographic, and gender filters used to target women interested in STEM, we analyze prospect profiles purchased in Texas. The University of California, San Diego made a total of 11 orders targeting women in STEM, which resulted in 12,938 prospect profiles purchased. Of the 10,668 total out-of-state prospective student profiles purchased by the university, 1,134 of these prospects are from Texas. We selected to “zoom” into Texas to take advantage of data provided by the Texas Education Agency on AP test takers as a comparison group for purchased prospects. Thus, we focus analyses on the 559 of the 1,134 Texas prospects whose profiles were purchased via AP filters. However, given the well-documented racial and economic disparities in access to AP coursework, we first compare prospects to the population of 15-19 year olds in their home zip codes and in zip codes where zero prospective students' profiles were purchased. Broad patterns in the comparisons of prospects to the population of 15-19 year olds across zip codes were similar for the other two top ranked states with the most prospect profiles purchased via AP filters (e.g., New York, Florida) [DOUBLE CHECK THIS KS- TRUE FOR Metro areas but need to check entire states].

[KS: just realized comparison group race/ethnicity are not just women; includes all gender; need to pull ACS data with race/ethnicity BY gender; but I don't think general patterns will change significantly by include only women]

Our analysis first focuses on comparing the racial characteristics of Texas prospects whose profiles were purchased to the population of 15-19 year olds in their home zip codes. The university purchased at least one prospective students' profile from 203 of the 1,935 zip codes

⁶The second university also targeted women interested in engineering majors through the use of segment filters at the high school and neighborhood levels in combination with some achievement filter (e.g., PSAT, SAT, GPA).

in Texas. Figure X presents the racial characteristics of prospects to the population of 15-19 year olds in these 203 zip codes. The figure shows two general trends consistent across orders targeting Women in STEM. First, White and Asian prospects are overrepresented relative to the population of 15-19 year olds in their home zip codes. For example, nearly 40% of all purchased prospects are White while 38% of the 15-19 year olds in their home zip codes are also White. This difference is much larger for Asian prospects, who make up nearly 30% of all purchased prospect profiles but only make up about 6% of the population of 15-19 year olds in their home zip codes. Second, Black and Latinx prospects are underrepresented to their zip code populations. Black and Latinx prospects make up 2% and 20% of all purchased prospects, respectively, while their home zip code's population of 15-19 year olds are on average 10% Black and 36% Latinx. It's important to note that only 3 of the 559 prospects purchased across Texas were Native American. While looking at proportions across the population of 15-19 year olds in zip codes invisibilizes the number of Native American students in relation to other racial/ethnic groups, the 3 prospects are relative to a total of 3,623 Native American 15-19 year olds living in these 203 zip codes.

Figure 17: FIGURE COULD BE SOME VARIATION OF THESE DATA



As a proxy for comparing prospects to prospective students in Texas whose profiles were not purchased by the university, we also compare the racial and economic characteristics of prospects to the population of 15-19 year olds in the 1,732 non purchased zips in Figure X.

Comparing prospects to the average population of zip codes where zero prospective students' profiles were purchased, Asian prospects are again overrepresented while White prospects shift to being slightly underrepresented. For example, on average, less than 2% of 15-19 year olds in non-purchased zip codes are Asian but nearly 30% of prospects are Asian. The population of Black and Latinx 15-19 year olds are relatively the same in non-purchased zip codes to prospects' home zip codes, which result in similar disparities between prospects and non-purchased zip code populations to comparisons with their home-zip codes above.

Figure X also shows the economic characteristics of prospects and prospective students in Texas whose profiles were not purchased by comparing the average median household income of prospects' home zip codes to the the average median household in the 1,732 non purchased zip codes. Prospects whose profiles were purchased by the university tended to be much more affluent than non-purchased prospective students. For example, purchased prospects live in Texas zip codes where the average median household income is \$84,722. In comparison, populations living in the 1,732 non purchased zip codes have an average median income of \$56,862.

Lastly, we use AP participation data from the Texas Education Agency to compare the racial characteristics of prospects whose profiles were purchased by the university to the population of AP science test takers in Texas.⁷ The racial and economic inequities in access to AP coursework and disparities in passing rates are well-documented (CITE). However, we compare prospects to test takers to illustrate how using AP score range filters, rather than just proxying STEM interest by students who have the ability to and take AP science coursework, further exacerbates inequities in whose profiles are purchased.

Figure X compares the racial characteristics of prospects to AP science test takers in Texas. Even though AP test takers is likely to inequitably underpredict the number of women interested in STEM due to disparities in access to advanced coursework, we still see large disparities between prospects and test takers. For example, Black students make up 6% of AP science test takers but only 2% of purchased prospects. Similarly, Latinx students make up 40% of test takers but only 15% of AP test takers.

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⁷These figures also include students who took the International Baccalaureate science exam

Figure 18: FIGURE COULD BE SOME VARIATION OF THESE DATA



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