Triage in Unequal Contexts: Fairness Perceptions and Prioritization in K-12 Education

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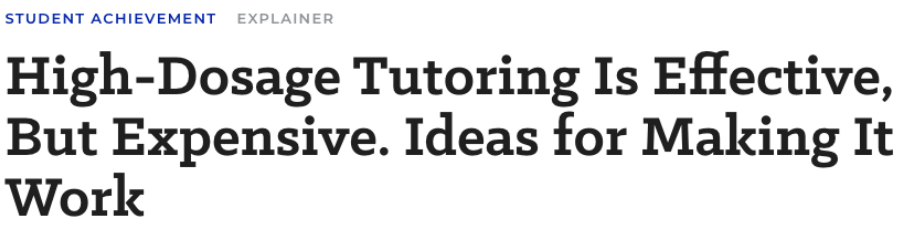
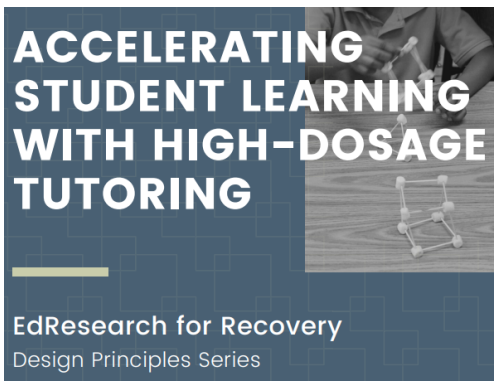
Sociology of Education Association. February 2022
V1 of pre-analysis plan: https://osf.io/vx7de/

Motivation: districts and schools ration various resources

Who is rationing?	**What's being rationed?**
Teachers	Extra academic attention for students (Jennings, 2005; Penn, 2022)
Schools	Seats in gifted classrooms (Ispa-Landa and Conwell, 2015; Grissom and Redding, 2016; Fish, 2017; Shores, Kim, and Still, 2020)
Schools or districts	Seats in selective public schools (Berends, 2015; Fong and Faude, 2018) Speaking minutes at school board meetings (Downing, 2022) Extra help from a one-on-one tutor

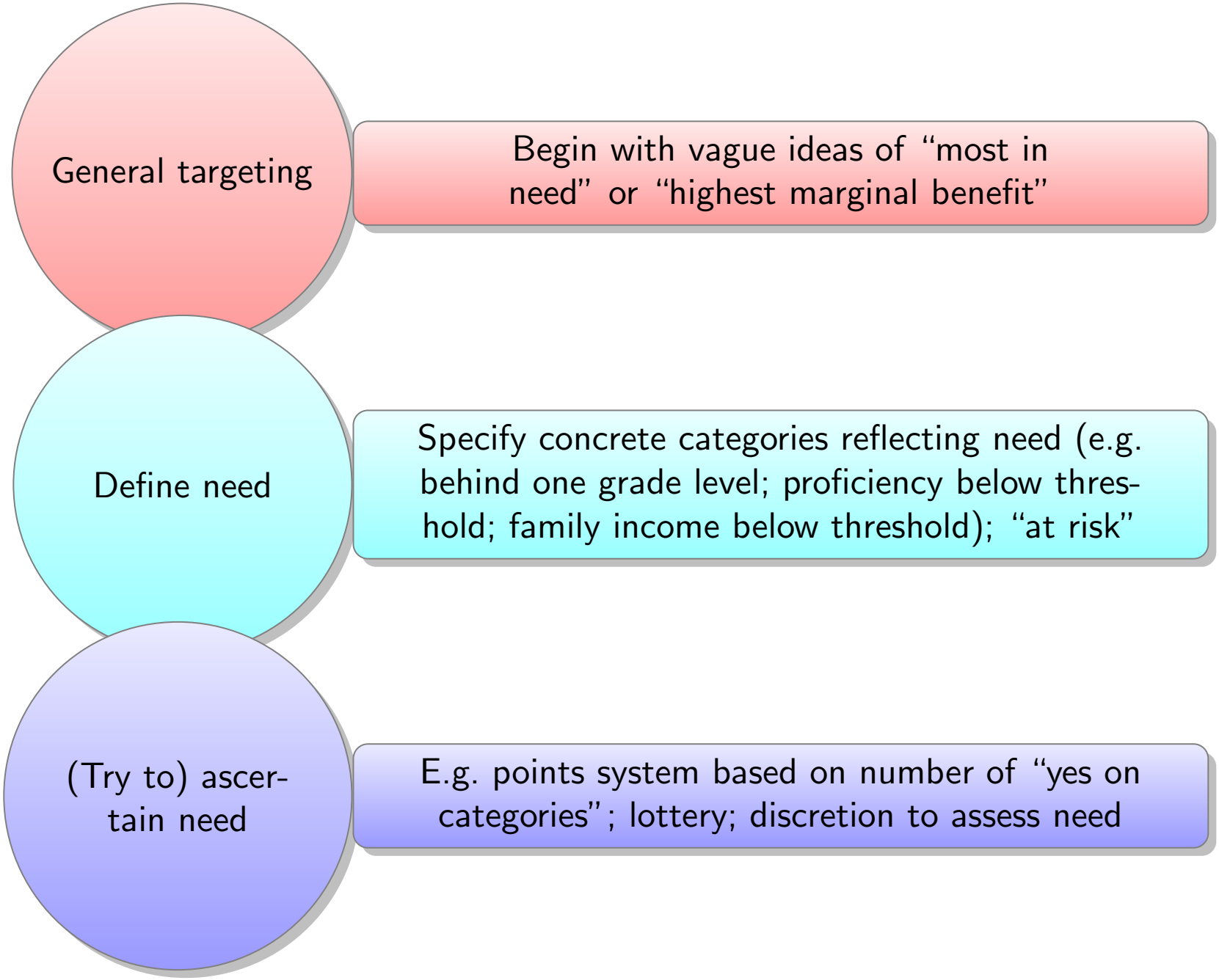
Case of rationing: "high-dosage/high impact tutors" in K-12 schools in wake of COVID-19





What we know potential impact of high-dosage tutors on student outcomes and policy recommendations (Nickow, Oreopoulos, and Quan, 2020; Robinson, Kraft, Loeb, Schueler, 2021; Kraft and Falken, 2021; Kraft et al., 2022)

What we don't know: how do stakeholders judge the fairness of different ways of deciding which K-12 students "need help", reflecting ideas of "humane justice" (Jencks, 1988)?


General targeting
Begin with vague ideas of "most in need" or "highest marginal benefit"
Define need
Specify concrete categories reflecting need (e.g. behind one grade level; proficiency below threshold; family income below threshold); "at risk"
(Try to) ascertain need
E.g. points system based on number of "yes on categories"; lottery; discretion to assess need

Compare algorithms to four longstanding methods for ascertaining "need"

Method	**Forms of inequality**
Parent requests for help for their child	Cater to higher-SES families (Lareau, 2011; Lewis and Diamond, 2015; Lewis-McCoy 2014; Calarco, 2018, 2020); when parents of color advocate for their child, racialized orgs. mean fewer returns to that advocacy (Lewis-McCoy 2014; Ray, 2019; Manning, 2021; Cartwright, 2022; Penn, 2022)
Counselor discretion	Lack of individualized knowledge (Holland, 2015; Gast, 2016; Sattin-Bajaj et al. 2018)
Simple rules/categories (e.g., FRPL)	False negatives in who proves membership (Domina, Penner, and Penner, 2017; Bruhn, 2022)
Weighted lotteries	Similar issues to categories

Contributions: contextualize rise of "algorithms for care" (Brayne, 2017) in schools against longstanding methods districts and schools use to ascertain need

Data and Methods

Experiment to compare judgments of relative fairness

A [randomized district racial/ethnic composition] is facing COVID-19 learning losses. While some students are doing fine, others are struggling.

The school district will be giving some struggling 9th-grade students a tutor. The tutor will meet one-on-one with the student during the school day to help the student catch up.

The problem: Unfortunately, one-on-one tutors are expensive. The district only has enough money to give tutors to 15 percent of the many struggling students.

How do schools decide which students get tutoring? Initially, each school's guidance counselor has been:

Randomized to one of four methods district has used determine which students receive tutors:

- **Simple rule:** Test score and income cutoff
- Parent requests
- Weighted lottery
- Counselor judgment

Vignette continued...

However, an analytics team within the district has proposed a new method. This method is an algorithm, also known as a predictive model. The predictive model would:

- Analyze the student records of every student in the district from the past 10 years;
- Use test scores, grades, attendance, and family financial need to learn what predicts whether a student will fail 9th grade;
- Then use what it learned to identify current students who are most likely to fail 9th grade.

School counselors would provide tutors to students the model recommends.

Summary: we want your opinion about how the school should give out tutors:

- **How the school district initially gave tutors**: each school's counselor has been [*other method*]
- **How the school district could give tutors**: each school's counselor would use an algorithm or predictive model.

Initially, each school's guidance counselor has been...

Method	Wording
Parent requests for help for their child	...using parents' requests as they come in for a tutor for their child to decide which students get tutors. The district has encouraged parents to only request tutoring if they believe that their child's academic trajectory and their family's financial need mean the child needs a tutor.
Counselor discretion	...using their judgment and personal knowledge of students to decide which students get tutors. The district has encouraged guidance counselors to weigh students' academic trajectories and family financial need when selecting students.
Simple rules/categories	...using a test score and family income cutoff set by the school district to decide which students get tutors
Weighted lottery	...drawing students' names randomly to decide which students get tutors, giving some students a better shot at winning the lottery based on their academic trajectories and family financial need

Pros of standardizing inputs: holds definitions of need constant while varying method for ascertaining need; **Cons:** lack of realism especially for parent requests

Outcomes and status update

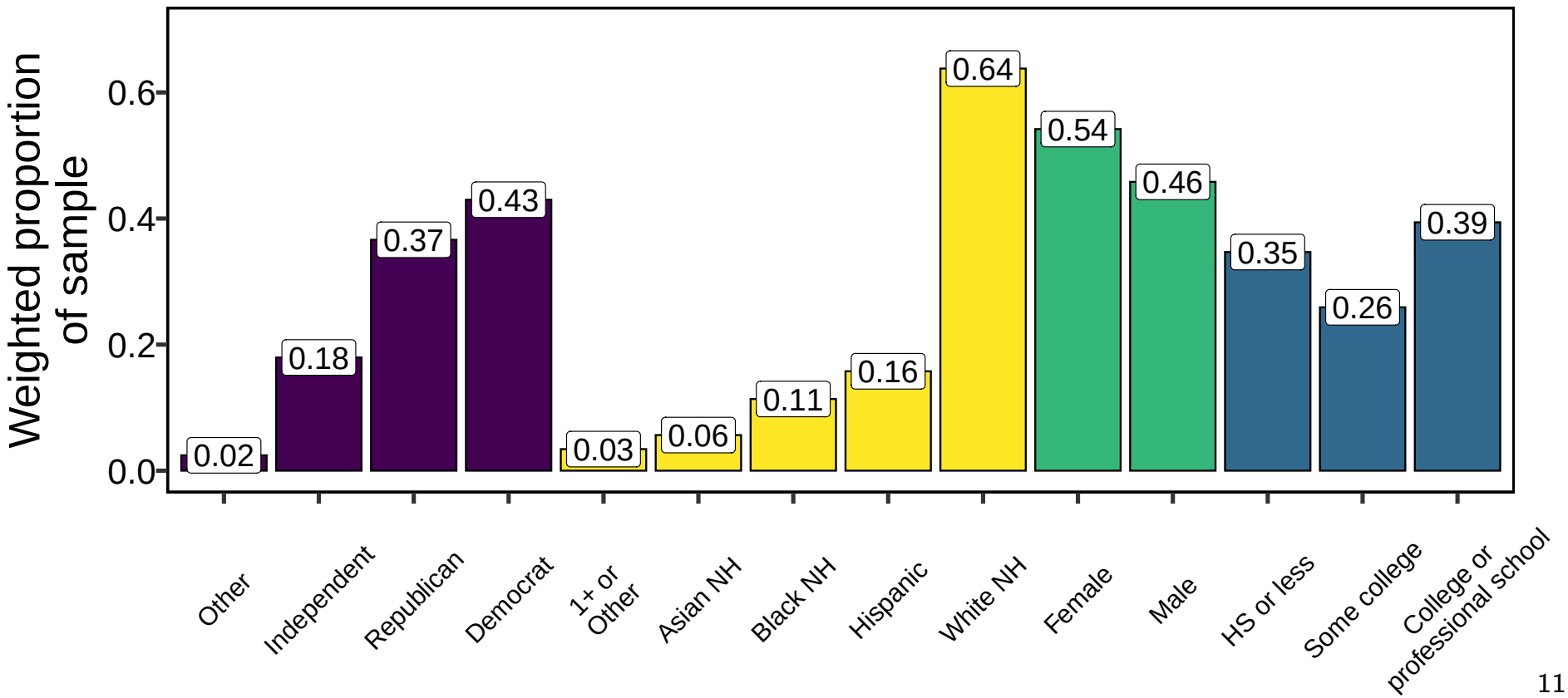
- **Outcomes:** which is more fair? Open-ended responses for why; district is pressed for time, which is most efficient? Continuous rating of relative fairness
- **Pre-treatment moderators:** race/ethnicity; gender; current parent or not; political ideology
- **Potential mediators (among parents):** trust in school officials and/or teachers (1) taking input into account and (2) have child's best interest at heart
- **After rating the two methods (algorithm versus one status quo), all respondents read a status update about algorithmic bias**

▸ Wording: status update

Sample

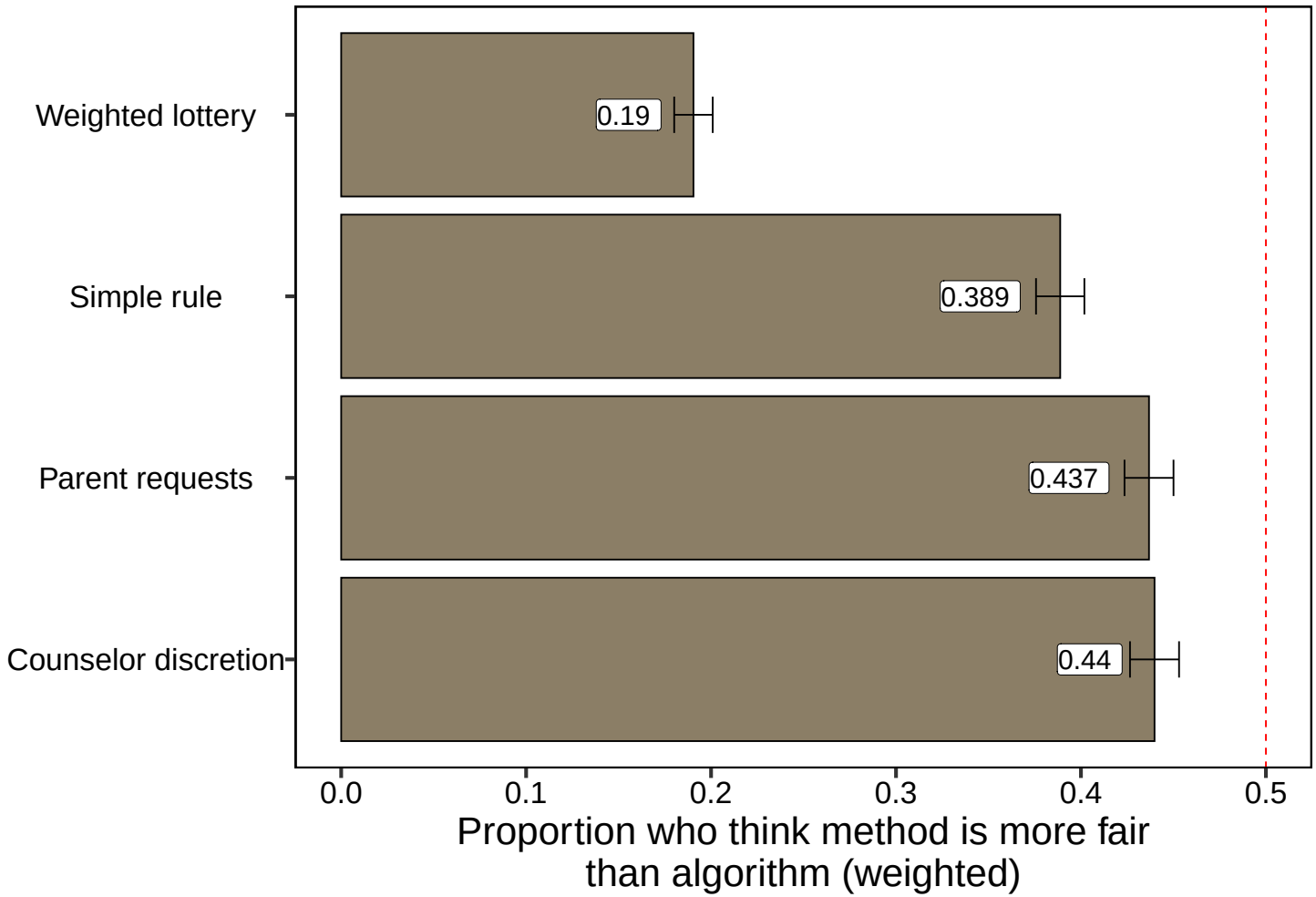
NORC AmeriSpeaks Panel (nationally representative of US) funded by NSF TESS with $N \sim 5,440$ respondents

- **General population sample:** $\sim$ 4,300
- **K-12 parent oversample:** $\sim$ 1,140



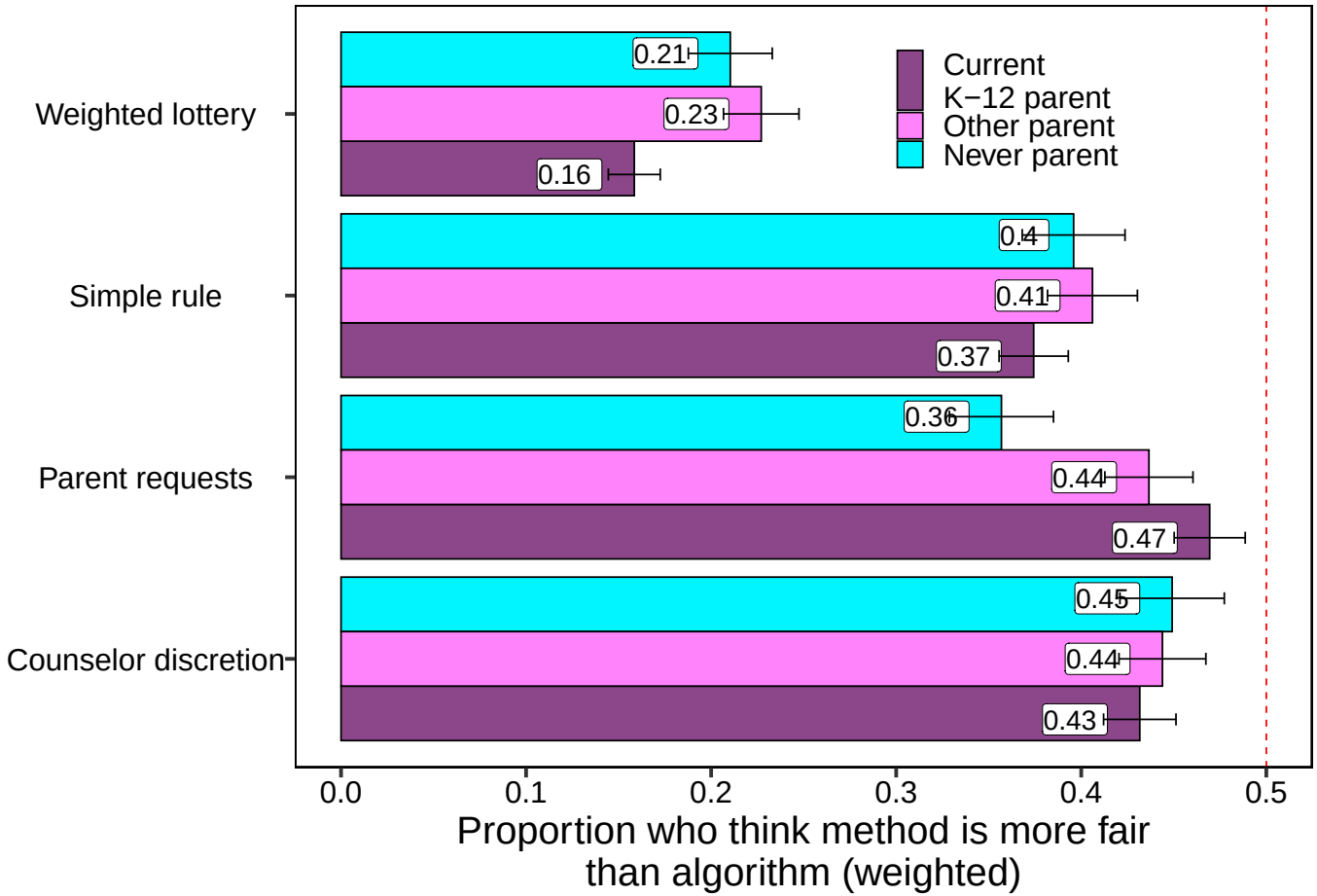
Preliminary Results

Finding 1: all respondents view status quo methods as significantly less fair than algorithm



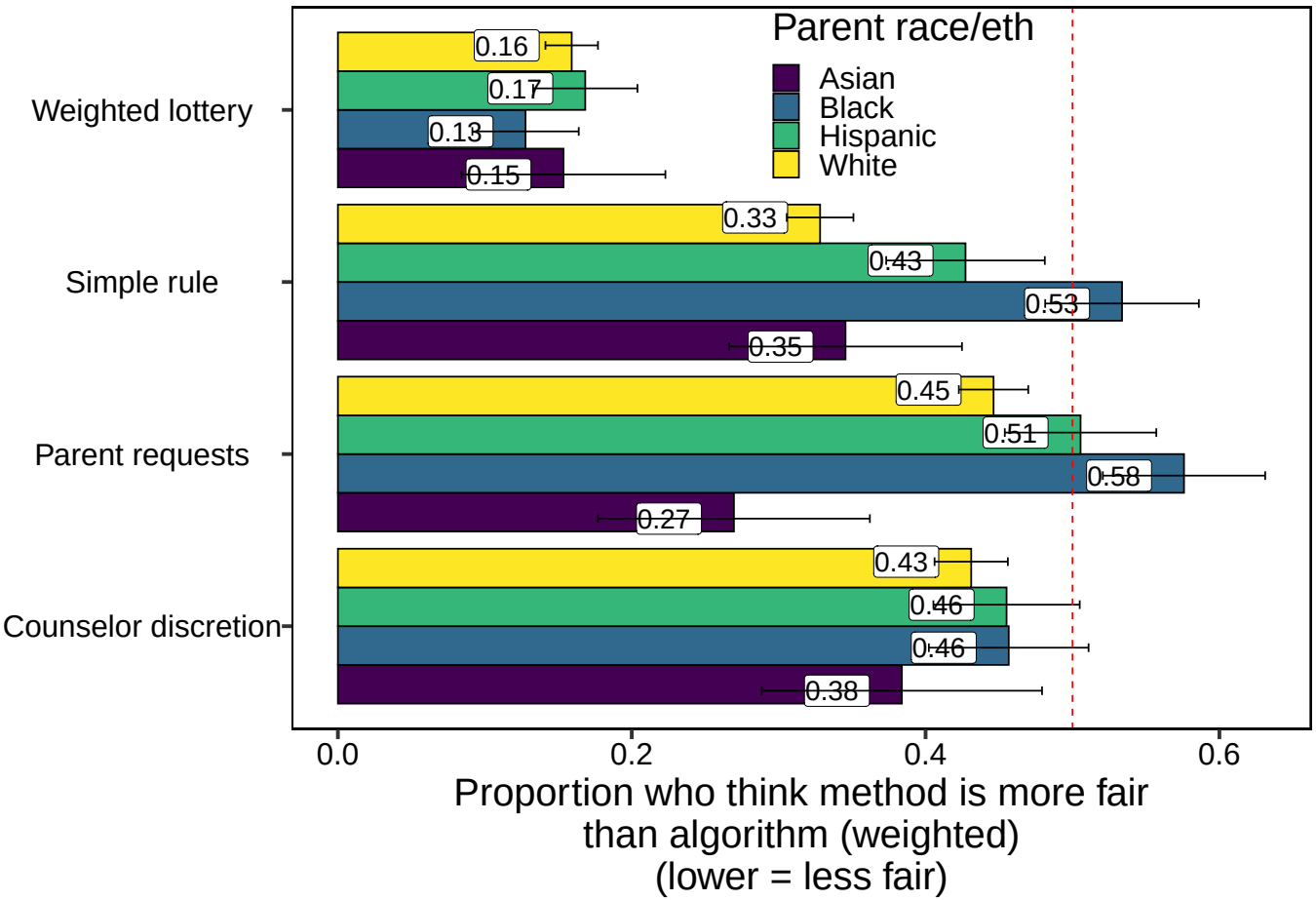
$p < 0.0001$ for two-tailed test of difference in proportions from equally fair

Finding 2: current K-12 parents think parent requests are significantly more fair than never parents



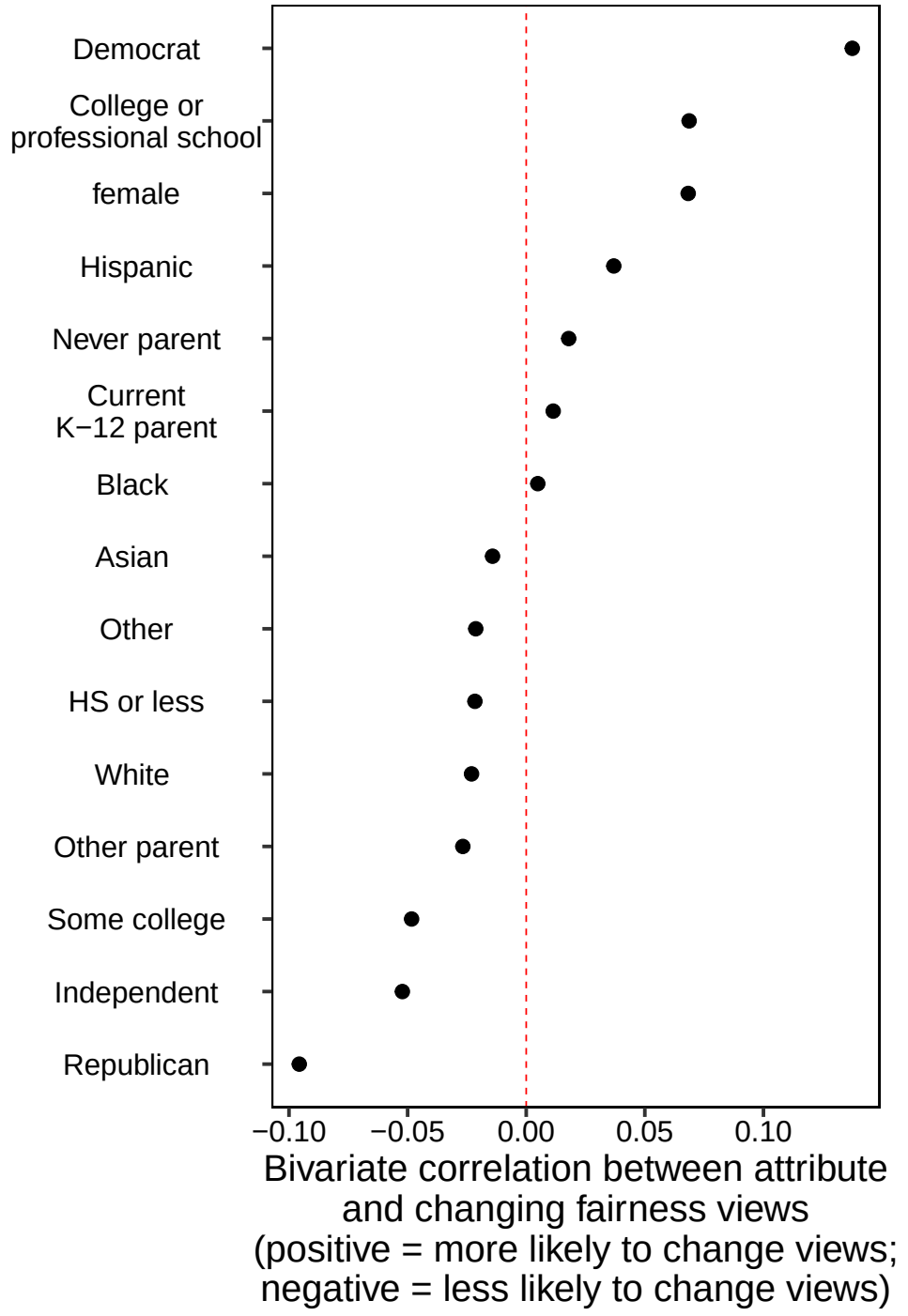
$p < 0.01$ for contrast between current parent:never parent; $p = 0.16$ for contrast between non-current parent:never parent

Finding 3: heterogeneity among current K-12 parents



Interpretation: Black parents may prefer parent requests and simple rule to algorithm; Asian parents may be especially skeptical of counselor discretion and parent requests

Who changes views following information about algorithmic bias?



Exploratory free response: why parents over algorithm?

Parent expertise is more accurate than the model's data

"Parental requests and actual student need should always supercede analytical data" (*Black, Female, Current parent, Democrat, College+*)

"The predictive model does not give any consideration to factors that are not quantifiable within the data available. For example, the data may not show that a student lost a parent or loved one recently, which could have an adverse impact on the student's ability to study and pass his or her classes. Additionally, not every student handles adversity in the same way. Some students with data showing a high likelihood of success may actually be suffering in light of the pandemic, but this would only be known if the information is obtained from parent requests" (*White, Female, Current parent, Democrat, College+*)

Model might result in false positives

"A parent knows their child's strengths and weaknesses and also knows when the child is serious about his grades. Some children need a second chance. A predictive model is just what looks good on paper" (*Black, Female, Current parent, Democrat, Some college*)

Exploratory free response: why algorithm over parents?

Recognizing inequalities in advocacy but othering the potential beneficiaries:

> "Some students may have parents who simply want their children to have an edge by having one on one tutoring and therefore those with the pushiest parents would get the tutor...A predictive model takes into account data points that are more or less objective and hopefully will provide a better estimation of which students are most at risk of failing. It breaks my heart that so many children will have suffered learning issues during the pandemic as a result of virtual learning. As a nation we need to do everything we can to make it up to them" (*White, Female, Current parent, Democrat, College+*)

> Sadly, some children do not have parents or guardians that know enough about the child's schooling, studying, and needs associated with their learning at school. A predictive model could possibly get children of certain socioeconomic states help that they are currently being neglected (*White, Female, Current parent, Republican, Some college*)

Exploratory free response: why algorithm over parents?

Recognizing race and class dimensions of vocal parents:

> "One is using the data (test scores, attendance, report card grades) to determine who needs the support the most. This model is fair because the students who have means and vocal parents tend to be white (based on experience and research). If the school relies on parent request, more white children will receive support from tutors than black and brown students" (*Black, Female, Current parent, Democrat, College+*)

> I believe that a predictive model is fairer than a parent asking for tutor because most parents aren't likely to ask for help due to work or language barrier. Also some parents aren't around to see what's going on with the child's grades or attendance (*Hispanic, Female, Current parent, Democrat, High school or less*)

Preliminary conclusions and next steps

- Algorithms to rank "student need" are an attempt at *algorithms for care* (Brayne, 2017); contrast to *algorithms for suspicion* like school facial recognition and surveillance tools
- **Quantitative patterns:** respondents view algorithms as significantly more fair than four other triage methods; between-parent heterogeneity with Black parents more skeptical of algorithms and slightly more favorable towards parent requests
- **Initial qualitative patterns:**
  - White mothers: concern for "others with no advocates"
  - Black and Hispanic mothers: "vocal parents" as racialized and classed category
- **Next steps within the study:**
  - Impact of signaled school racial context: to address Eubanks (2018)
  - Role of time pressure
  - Respondent tract $\implies$ home district; racial and SES context
- **Next steps more broadly:** from perceptions of K-12 algorithms for ascertaining "need" to real-world impact

Thanks!

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Parents or mothers?

Question wording: "I am a parent/guardian and at least one of my children will be in kindergarten through 12th grade during the 2021-2022 school year"

Self-identified category	Proportion female
Current K-12 parent	0.636
Non-current K-12 parent	0.506
Never parent	0.426

◂ Back to results

Wording: status update

Status update: The school district decided to use a predictive model. But a year into using it, the district noticed an alarming pattern. The model worked fine for students who had been in the district since elementary school. But for students whose families moved around a lot, the model incorrectly rated them as low need. That was because the model had no test score data or grades from the students' old districts.

The students who moved around a lot often came from lower-income families. And the model never recommended that these students receive a tutor.

◂ Back to methods