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A growing body of research and popular reporting shows racial differences in school modality choices during the COVID-19 crisis, with white students more likely to attend school in person. This in-person learning gap raises serious equity concerns. We use unique panel survey data to explore possible explanations. We find that a combination of factors may explain these differences. School districts' offerings, political partisanship, and local COVID-19 outbreaks are all meaningfully associated with and plausibly explain the in-person learning racial gap. As schools start offering more in-person learning, significant efforts may be necessary to ensure that families and students attend those in-person learning opportunities.

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Determinants of Ethnic Differences in School Modality Choices during the COVID-19 Crisis

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ABSTRACT

A growing body of research and popular reporting shows racial differences in school modality choices during the COVID-19 crisis, with white students more likely to attend school in person. This in-person learning gap raises serious equity concerns. We use unique panel survey data to explore possible explanations. We find that a combination of factors may explain these differences. School districts' offerings, political partisanship, and local COVID-19 outbreaks are all meaningfully associated with and plausibly explain the in-person learning racial gap. As schools start offering more in-person learning, significant efforts may be necessary to ensure that families and students attend those in-person learning opportunities.

Keywords: Learning options, racial gaps, Covid-19

JEL Codes: I24, I28, J15

1. Introduction

In the spring of 2020, the COVID-19 pandemic closed schools throughout the United States. The resulting shift to remote learning created a significant strain on teachers, students, and families. School districts rapidly created policies and repurposed technology to facilitate remote learning, often with dramatically different results for different students. One retrospective analysis of district policies found that students from high-poverty communities were typically held to less rigorous expectations, such as student work not completed for a grade (Malkus, 2020). Projections of student learning loss indicate that COVID-19 related school closures and remote learning may have negative impacts (Kuhfeld et al., 2020), particularly for students from low-income backgrounds (Agostinelli et al., 2020).

In the fall of 2020, schools began to reopen using in-person, hybrid, and remote learning models. However, a lack of centralized decision-making often left reopening decisions to individual school districts, resulting in a patchwork approach where students in neighboring communities may have very different opportunities and experiences. Initial studies of district reopening plans have compared district survey responses with district demographics and determined that Black and Hispanic students were returning to completely online classrooms at a higher rate than white students. An analysis from the Brookings Institution argues that race simply functions as a proxy for urbanity, and that larger, urban school districts are taking more extreme measures to curb the potential spread of COVID-19 (Smith & Reeves, 2020). In contrast, a separate investigation instead argues that a combination of political polarization and parental preferences may be responsible for the under-representation of minority students in in-person learning (Belsha et al., 2020).

Understanding the nature of this apparent racial gap is of significant interest to policymakers and stakeholders. In early 2021, President Biden stated that the reopening of schools to in-person learning was a national imperative (The United States, Office of the Press Secretary, 2021). In both the president's statement and congressional

legislation, the focus has been on providing funding for additional resources schools may need to reopen safely. However, if racial gaps in attendance modality are motivated by factors other than the availability of in-person learning, reopening for in-person learning may not be sufficient to ensure a full return to the classroom for certain groups.

In this paper, we use data from the Understanding Coronavirus in America Tracking Survey (UCA), an internet panel comprising a nationally representative sample of American households, to study potential factors behind observed racial differences in learning options during the fall of 2020. We merge this data with election polling data from the same respondents to capture political leanings, measures of local COVID-19 outbreaks, and information on available school learning options from a large database of school district reopening plans. We find that political partisanship, availability of learning options, and whether parents were given a choice of their student's school modality (in-person, remote, or hybrid), all play a sizeable role in explaining observed ethnic differences in in-person and remote learning options. Parents also appear responsive to local COVID-19 incidence rates. However, our results indicate that a significant contributor to the observed racial gap in in-person learning is school districts' supply of learning options. It appears that when allowed to choose parents are inclined to select in-person learning.

2. Connections to Existing Research

The impact of COVID-19 on students and families is an emerging field of research. Projecting the potential impact of early school closures in the spring of 2020 has been a particularly active segment of this literature. Although these projections are inconclusive, the majority of findings indicate that learning losses may be large, persistent, and concentrated among students from high-poverty and majority-minority neighborhoods (Agostinelli et al., 2020; Dorn et al., 2020; Kuhfeld et al., 2020). Initial results from assessments administered in controlled environments appear to confirm these projections. In Ohio, incoming third-grade students appear to have lost approximately one-third of a school year's progress in language arts as a result of the pandemic (Kogan & Lavertu,

2021). These losses were particularly severe for Black and Hispanic students as well as students from communities with high rates of pandemic-induced unemployment. Declines in achievement were also higher among school districts that began their academic year fully remote as compared to those who offered some in-person learning options to their students. Analyses of internet search data (Bacher-Hicks et al., 2021) and online math instructional software use (Chetty et al., 2020) indicate that families and students in high-poverty communities engage with remote learning resources at significantly lower rates than their more affluent peers. While creative proposals for addressing the potential consequences of COVID-19, like Kraft & Falken's proposed tutoring efforts (2021), hold some promise, they are largely predicated upon a return to traditional, in-person schooling.

Despite the stated policy objectives of political leaders and some school systems, a successful full return to in-person learning has not occurred for most students in the United States. One analysis of a nationally representative sample of 477 school districts found that while most districts did not change reopening plans, those that did tend to move towards more remote rather than in-person learning during the fall 2020 semester (Gross et al., 2020). Early reporting from both the Associated Press and the Brookings Institute each use separate surveys of districts to reach the same conclusion - remote learning is more prevalent in low-income, urban, diverse school districts (Belsha et al., 2020; Smith & Reeves, 2020). This gap appears to have persisted in the spring 2021 semester. Data from the first federally-administered survey of school reopenings and attendance indicates that Black and Hispanic students are nearly twice as likely to be enrolled in remote learning than white students (U.S. Department of Education, Institute of Education Statistics, 2021). These and similar analyses are somewhat limited by a reliance on district survey responses. While these surveys typically ask districts to categorize their reopening plans, districts may offer multiple options for families to choose from. Both availability and families' uptake of options is not well reflected by districts' survey responses.

Parolin & Lee (2020) analyze cellphone geodata and claim that school buildings with high proportions of non-white students and students who qualify for free or reduced lunch were more likely to appear closed during the fall 2020 semester. However, with this data, it is difficult to disentangle district policies from individual decisions and this distinction may be important. For example, in early October the majority of New York City public schools reopened for in-person learning. However, by the end of the month, only 26% of students had attended a single in-person class (Shapiro, 2020).

There is reason to believe that racial and ethnic minorities may be more hesitant to return to in-person learning. Black and Hispanic individuals have been disproportionately afflicted by the pandemic, with hospitalization rates almost five times that of white persons for both groups (Centers for Disease Control and Prevention, 2020). Shapiro et al. (2021) document survey and interview data indicating that Black families may be skeptical of in-person learning due to both the disproportionate impact of COVID on their communities and historic abuse by government and medical establishments.

Adding to the complexity, responses to the pandemic have become politicized (Shao & Hao, 2020) with Republicans calling for an immediate reopening of schools and Democrats urging caution, at least until vaccines are widely available. Lower rates of in-person learning among Black and Hispanic communities may plausibly be a result of individuals in those communities tending to support Democratic party positions. Not only are individual perceptions of the pandemic influenced by politics, but so are districts' reopening decisions. An analysis using a large sample of school districts found that a local conservative political leaning was the strongest predictor of districts' decision to open in-person (Hartney & Finger, 2020). The interplay of demographic, political, epidemiological, and district policy factors on learning modality choice creates a gordian knot that previous research has been unable to untie. We leverage unique data drawn from a nationally representative sample of American households to better document observed racial differences in learning modality and study the role of a variety of factors including political leanings, the supply of learning options, and rates of COVID-19 incidence, among others. To our knowledge, this is the first analysis to use family-level

data to explore racial differences in student's learning modes of return to schools following the unprecedented COVID-19 school closures.

3. Data & Descriptive Statistics

Starting in March of 2020, the Dornsife Center for Economic and Social Research (CESR) at the University of Southern California has collected data about the pandemic's impact on American households through the Understanding Coronavirus in America Tracking Survey (UCA)[1]. Participants in the UCA were recruited from the nationally representative Understanding America Study (UAS) online panel, resulting in a sample of over 6,000 individual respondents who to date have completed 24 waves of data. For the first year of the pandemic, UCA was administered as biweekly survey waves that varied somewhat in focus but collected information about labor status, perceived COVID-19 risk, educational experiences for children in the household, psychological distress, mask usage, among other topics.

We use responses from wave 15 of the UCA which were gathered between September 30th and October 27th, 2020. As our focus in this study is the apparent racial gap in student mode of attendance, we restrict our sample to UCA respondents with school-age children in the household. This results in a sample of 1,441 unique respondents. In wave 15, respondents with school-age children in the household provided information on a series of education questions including mode of learning attendance (in-person, hybrid, or remote) and type of school (public, charter, or private). For respondents with multiple children, one was selected at random, and questions were exclusively asked about that randomly selected child.

<<<<Figure 1A – Learning Modality for Respondents>>>>

Figure 1A represents the proportion of respondents choosing each learning option (in-person learning, hybrid, remote, or homeschooling) while Figure 1B displays the

[1] https://uasdata.usc.edu/index.php

distribution of mode of attendance by race in our sample. A majority of American parents (68%) chose some sort of remote learning (fully remote or hybrid) for their school-age children. The disproportionality in in-person attendance noted by others is also present in the UCA wave 15 data. Black and Hispanic students in our sample appear 16 percentage points less likely to attend school in-person than white students, with 77% of Black respondents and Hispanic respondents declaring their children attend school through fully remote or hybrid learning options, as compared with 61% of white parents.

<<<<Figure 1B – Learning Modality by Race>>>>

Additionally, in wave 15 respondents were asked to "grade" their child's school using an A-F, 5-point scale, across several dimensions for three time periods (pre-COVID-19, spring 2020, and fall 2020). We use respondent's assessment pre-COVID-19 of overall education quality, quality of feedback from teachers, student's relationship with their teachers, student's academic engagement, instructional quality across core subjects (Math, English, and Science), and ability of the school to keep their child healthy to construct a measure of school quality. To ease interpretation, we first reverse code respondent's answers (i.e., 5 indicates an "A" rating).

Similarly, we use respondent's assessment of the trustworthiness of news agencies and government health officials collected during wave 7 of UCA (June 10 to July 8, 2020), to construct a measure of media trust. This media trust measure is calculated by averaging respondent's ratings of 8 news sources (ABC, CBS, CNN, FOX, MSNBC, NBC, local news, and local TV) and 3 public health information sources (CDC, HHS, and public health officials generally). These ratings, and the resulting measure of media trust, exist on a 4-point scale where a rating of 4 corresponds to complete trust and a value of 1 corresponds to no trust at all. Respondents' demographic characteristics, such as level of education, household income, and employment status information, are also collected as part of the UCA panel and included in our analysis.

In addition to collecting data about households' experiences during COVID-19, UAS members were also asked to participate in an election tracking poll from August

through early November of 2020. We match UCA respondents with their latest election polling responses to determine their political leaning. We construct a categorical variable of political leaning using the respondent's latest declared net probability of intention to vote for either Donald Trump or Joe Biden before the election of November 2020. Respondents with a greater than 50% declared net probability of intending to vote for a particular candidate are categorized as a Trump or Biden voter. If respondents had less than a 50% net probability of intending to vote for either candidate, we classified them as undecided voters. Defining respondents in terms of their net probability allows us to differentiate between individuals with strong political views who may be more likely to extend those beliefs to their reaction to the COVID-19 pandemic.

In addition to individual-level differences captured by the UCA and the election surveys, the supply of different learning options and the local level of incidence of the COVID-19 pandemic are potentially important determinants of parents' choice of learning options. To control for the supply of learning options, we merge the UCA data with estimates of learning options supply at the census-track level when possible and county level when we are unable to merge at the tract-level[2]. Data for these supply estimates comes from MCH Strategic Data[3], which has regularly collected information of school district re-opening options (either only remote learning available or district's preferred model of learning if multiple options are available) since the Summer of 2020 and has obtained information on 92% of school districts in the country. This is, to our knowledge, the most comprehensive source of information on school re-openings and supply of learning options.

We use MCH survey data as reported in October 2020, when wave 15 was collected. At this point, MCH had processed reopening plan data for 78% of districts nationwide. Thus, we construct census-tract/county-level estimates of learning options exposure for each tract as the proportion of students in the track school districts that are

[2] 4.8% of respondents were merged at the county level instead of the census-track level. Unfortunately, we were unable to merge any learning options supply information for 2.2% of respondents.
[3] https://www.mchdata.com/covid19/schoolclosings

offered a given learning option. We then build three binary variables indicating whether only remote learning is dominant for that census-tract or county of the respondent and whether hybrid or in-person learning is preferred when multiple learning options are available. Figure 2 presents a map with the dominant district reported learning option as of October 2020, at the county level. As we can see in this figure, there was considerable geographic variation in the supply of learning options across the U.S.

<<<<Figure 2 – Learning Modality Map>>>>

To control for the local level of COVID-19 incidence, we also merge the UCA data with information from the repository from Johns Hopkins' Center for Systems Science and Engineering[4] at the county level[5]. We use the COVID-19 incidence rates per 100,000 inhabitants and case-fatality rates as measures of the local outbreak respondents may be exposed to. The case-fatality rate is defined as the proportion of confirmed COVID-19 deaths among those who have tested positive from COVID-19. We use data from the first day of wave 15 data collection to better capture the respondent's context.

Some research has noted that homeschooling may have increased during the COVID-19 pandemic (Prothero & Samuels, 2020). Wave 15 of the UCA survey allows respondents to indicate that they homeschool on two questions. The first question asks student modality (i.e., in-person, remotely, hybrid, and homeschooled) and the second asks what type of school students are enrolled in. We find that 3% of respondents report a homeschool modality while 6% of respondents report homeschool enrollment as opposed to enrollment at a public, private, or charter school. There is imperfect overlap between responses to these two questions, with nearly a third of respondents who report a homeschool modality also indicating that their children are enrolled in a public school. We believe that this may be caused by respondents conflating homeschooling with remote, at-home, learning. Instead of reclassifying respondents with what we believe they meant, we remove respondents who indicate either a homeschool modality or

[4] https://coronavirus.jhu.edu/map.html
[5] For 0.4% of respondents we were unable to merge any local outbreak information.

enrollment (N=125) to form our analytic sample. We report descriptive statistics for our analytic sample in Table 1 below.

<<<<***Table 1 – Descriptive Statistics of Respondents***>>>>

We report descriptive statistics using sampling weights in Table 1. To test for statistically significant differences by race, we use an adjusted Wald test with the null hypothesis of no differences across racial or ethnic groups ($\mu_{white} = \mu_{black} = \mu_{hispanic} = \mu_{other}$). Trends seen in our descriptive statistics largely align with our prior expectations. While 50% of our analytic sample reports their children attending remotely there are large differences by race. Only 39% of white respondents report using remote learning while between 60-66% of Black and Hispanic respondents report the same. We see differences in both income and education by race as well, with Black and Hispanic respondents tending to report lower levels of education and income than white respondents and respondents of other races. Across all races, about half of all respondents appear to be undecided voters. Of those who have indicated a strong political preference, the majority of white respondents indicate a preference for candidate Trump while a majority of non-white respondents indicate a preference for candidate Biden. Interestingly, the second most commonly available learning modality is hybrid while this is the least common modality used by respondents. This may indicate the importance of our family's decisions as opposed to districts' offerings.

4. Analytic Strategy

The mode of attendance for an individual child is both discrete and mutually exclusive. Therefore, we estimate the probability of respondent i selecting attendance modality j (i.e. fully in person-learning, fully remote, or hybrid[6]) for his/her school-age child, conditional upon a set of covariates x_i, using a multinomial logit model:

[6] Respondents choosing homeschooling or other learning options were excluded from our analysis. These respondents represented a relatively small percentage of our sample (9%).

$$P(Y_i = j|x_i) = \frac{\exp(\beta_j{}' x_i)}{\sum_{l=1}^{3} \exp\,(\beta_l{}' x_i)} \qquad j = \begin{cases} 1 \text{ for InPers.} \\ 2 \text{ for Remote} \\ 3 \text{ for Hybrid} \end{cases}$$

To explore the role of different explanatory factors in explaining observed racial differences in learning options, we define four sets of covariates and include them sequentially in our models. These covariate sets are shown below.

$$x_i' = \{\text{race}_\text{i}\} \quad (A)$$

$$x_i' = \{\text{race}_\text{i},\ \text{income}_\text{i},\ \text{education}_\text{i},\ \text{employed}_\text{i},\ \text{state}_\text{i}\} \quad (B)$$

$$x_i' = \begin{Bmatrix} \text{race}_\text{i},\ \text{income}_\text{i},\ \text{education}_\text{i},\ \text{employed}_\text{i},\ \text{schoolQual}_\text{i},\ \text{mediaTrust}_\text{i},\ \text{politics}_\text{i}, \\ \text{incidence}_\text{i},\ \text{caseFatalitiy}_\text{i},\ \text{state}_\text{i} \end{Bmatrix} \quad (C)$$

$$x_i' = \begin{Bmatrix} \text{race}_\text{i},\ \text{income}_\text{i},\ \text{education}_\text{i},\ \text{employed}_\text{i},\ \text{schoolQual}_\text{i},\ \text{mediaTrust}_\text{i},\ \text{politics}_\text{i}, \\ \text{incidence}_\text{i},\ \text{caseFatalitiy}_\text{i}, \text{schooType}_\text{i}, \text{choice}_\text{i},\ \text{exposure}_\text{i},\ \textit{state}_i \end{Bmatrix} \quad (D)$$

In specification *A*, we include respondent race as the sole explanatory factor to assess initial ethnic differences in learning options. Next, in specification *B* we add controls for respondents' level of income (3 dummy variables indicating yearly household income less than $40,000, between $40,000 and $100,000, and greater than $100,000), education (3 dummy variables indicating a high school degree or less, some postsecondary without completion, and completion of a post-secondary degree), a dummy indicating the respondent is employed, and state fixed effects to capture state-specific policies. Specification *C* builds upon this with the inclusion of our constructed school quality and trust variables, a categorical variable indicating political leanings, and variables measuring the local extent of COVID-19 outbreaks for each respondent, as described in the prior section. Finally, in specification *D* we add controls for the type of school the child is attending (public, private, or charter), whether respondents were offered a choice of attendance modality by their school, and the dichotomized school supply exposure variables (only remote learning, preferred in person-learning, preferred hybrid learning) described in the previous section. To maintain the national representativeness of our estimates, we use survey sampling weights provided in the

UCA data for our analysis. To ensure that our results are not sensitive to the survey wave, we conduct a similar analysis using responses from UCA wave 14. Details of this analysis and results are included in the appendix.

5. Results

To aid interpretation, we present our estimates as average marginal effects (AME) for each covariate x_k by modality j. Tables 2-4 describe our estimates for specifications A-D, which sequentially introduce additional covariates as explained in section 4 above, for in-person, remote, and hybrid learning modalities, respectively[7]. While we do not report average marginal effects for demographic controls, they are largely insignificant.[8]

<<<< Table 2 – AME for In-Person Learning>>>>

Looking at the results in Table 2, holding all else equal, non-white respondents are 15-19 percentage-points less likely to attend in-person schooling than white students. These estimates are significant at the 99% confidence level. With the inclusion of demographic controls and state fixed effects in specification B, we no longer see statistically significant differences between Hispanic and white respondents in the probability of choosing fully in-person learning. However, the estimated average marginal effect of being Black on the probability of attending in-person is essentially unchanged and remains statistically significant. Holding all else equal, being Black is still associated with a 19-percentage point decrease in the probability of attending in-person learning as compared to white respondents in this case. This estimate is still significant at the 99% confidence level. This effect is slightly diminished in specification C with the inclusion of controls for political leanings, school quality and media trust measures, and measures of local COVID-19 outbreaks.

In this specification, holding all else equal, being Black is associated with a 15-percentage point decrease in the probability of attending in-person as compared to white

[7] Results from our alternative analysis using UCA wave 14 are highly similar and discussed in the appendix.
[8] Full set of results available from the authors upon request.

respondents. This estimate is significant at the 95% confidence level. Additionally, we find moderately large statistically significant estimated effects for both political and epidemiological factors. All else equal, intending to vote for Trump in the November 2020 election is associated with a 13 percentage-point increase in the probability of attending school in-person as compared to being an undecided voter. This estimate is significant at the 99% confidence level. A one-percentage-point increase in the respondent's county-level COVID-19 incidence rate is associated with a 4.6 percentage-point decrease in the probability of selecting in-person learning, *ceteris paribus*.

<<Table 3 – AME for Remote Learning>>

Additionally, as reported in Table 3, Black and Hispanic respondents are 21 and 27 percentage points more likely to attend school remotely as compared to white students, *ceteris paribus*. Like our results for in-person modality, we find no statistically significant differences between Hispanic and white respondents in specification B, when controls for demographics and state fixed effects are included. In this specification, Black respondents are approximately 6 percent less likely to attend school remotely than in the specification without any controls. Adding in controls for political leanings, COVID-19 outbreaks, and school and media trust further reduces the racial gap between white and Black respondents. In specification C, Black respondents are 38 percent less likely to attend school remotely as compared to the unconstrained specification A. We also find that intending to vote for candidate Trump in the November 2020 election is associated with a 15-percentage point decrease in the probability of selecting remote learning as compared to being an undecided voter. This estimate is significant at the 99% confidence level. Respondents also appear to be responsive to local outbreaks, with a 1 percentage-point increase in local COVID-19 incidence rate associated with a 9-percentage point increase in the probability of attending school remotely.

Results of our preferred specifications, for the probability of choosing fully in-person and fully remote learning, are presented in columns D of Tables 2 and 3, respectively. In these full specifications, we no longer observe statistically significant

differences in learning modality by race at the 95% confidence level. We do find, however, a marginally significant effect for Black respondents in the remote learning modality. Consistent with our results from specifications C, we find statistically significant effects for both political and epidemiological factors. Holding all else constant, intending to vote for candidate Trump is associated with an 11-percentage point increased probability of attending school fully in-person and a 14-percentage point decreased probability of attending fully remotely. These estimates are significant at the 95 and 99% confidence levels, respectively. Our estimated impact of local COVID-19 incidence rates on remote learning is relatively unchanged, with a one-percent increase in local outbreaks associated with an 8-percentage point increased probability of learning remotely.

Additionally, specification D shows statistically significant estimated effects for our supply measures of school learning options. We find that the type of school students attend is important. Holding all else equal, attending a private or religious school is associated with a 41-percentage point increase in the probability of attending school fully in-person and a 26-percentage point decrease in the probability of attending fully remotely, as compared to enrollment in a public school. These estimates are significant at the 99% confidence level. Respondents whose schools gave them a choice of their children's learning modality were 15 percentage points more likely to select in-person learning as compared to those who report not being able to make a choice, *ceteris paribus*. This estimate is significant at the 99% confidence level. The offerings of local public-school districts also appear important. All else equal, if respondents live in areas where most districts prefer in-person learning they are 19-percentage point more likely of having children attending school in-person. This estimate is significant at the 95% confidence level.

<<Table 4 – AME for Hybrid Learning>>

Finally, we report our findings for the probability of choosing the hybrid modality in Table 4. In this case, we do not find almost any statistically significant predictors of

the probability of choosing a hybrid model of learning. Black respondents are 8 percentage points less likely to choose hybrid learning for their children than white respondents, but this effect is only marginally significant at the 90% level. Being from another race, however, is associated with an almost 16 percentage points lower probability of attending school in a hybrid model than being white. This effect is statistically significant at the 99% confidence level. Similarly, not many covariates appear to have statistically significant effects on explaining the probability of choosing the hybrid learning option, only COVID-19 incidence variables, and type of school appear significant. This could be because this is a less common option chosen among families.

6. Conclusion

The current COVID-19 crisis has put significant strain on teachers, students, and families. Although some schools started re-opening for in-person learning during the fall of 2020, options for returning to school during the 2020-2021 school year varied considerably. As a result, not all students have had access to the same learning experiences. We observe important racial differences in the learning modality of students during the 2020-2021 school year with Black and Hispanic students returning to school remotely at much higher levels than white students. Although a majority of parents (68%) in the U.S. have used fully remote or hybrid learning for their students, Black and Hispanic families are doing so at higher rates. 77% of Black and Hispanic families report doing fully remote or hybrid education for their children as compared with 61% of white parents. These observed racial differences along with concerns on the quality of remote education raise important concerns about the potential differential effects by students' race of the current COVID-19 crisis.

In this paper we use unique data from the Understanding Coronavirus in America tracking survey merged with the Understanding America Election poll data and information about public school districts re-opening plans and local incidence of COVID-19. We study which factors could help explain the observed racial differences in school

modality choice. We find that a combination of factors other than race may explain these differences. Politics, school policies, and the extent of local COVID-19 outbreaks all appear to have large, statistically significant impacts on the probability of a student attending school in-person or remotely. While we largely find null results for determinants of hybrid learning, we believe this is an area for future research. Our insight, that multiple factors likely influence if students attend school remotely or in-person, has meaningful ramifications for policymakers.

Our findings highlight the importance of leadership by both district administrators and elected officials. The bulk of public discourse about addressing potential learning losses has focused on what should be done once schools are reopened. Although our results do indicate that when allowed to choose parents are inclined to choose more in-person learning, other factors are also significant predictors of the choice of in-person learning. Therefore, getting students back into classrooms may not be as simple as opening school doors. If we indeed view returning to in-person learning as a national priority, significant efforts may be necessary to ensure that families and students attend those in-person learning opportunities.

Our results indicate that parents are responsive to local outbreaks. Plans to reopen schools for in-person learning should include a response to these local outbreaks such as temporarily closing until cases subside. District-level leaders can prepare for such events by establishing a strategy for getting work and devices to students should a closure occur. Despite the rich data we were able to leverage, there remain important and unanswered questions. Future research may explore the potential for political factors to "fade-out" following the contentious election and inauguration of President Joe Biden. As districts and government agencies release better attendance data our findings may be validated or challenged. Even once the pandemic has subsided, understanding what drove the apparent racial gap in in-person learning has ramifications for remediation of damage caused by lost learning.

Appendix

Wave 14 Sample

Wave 14 of the Understanding Coronavirus in America Tracking Survey was administered immediately before wave 15 from September 16th – October 14th, 2020. Although the two survey waves occurred sequentially, there are 233 respondents with children unique to wave 15 and 362 respondents with children unique to wave 14. 1,208 respondents with children participated in both waves. While questions in wave 15 pertained to a randomly selected child, questions in wave 14 were asked of all respondent's children. Of wave 14 respondents, 128 reported that they had multiple children participating in different modalities. We are unable to fully explore why respondents select different modalities for different children, and so we exclude these individuals from our sample. Additionally, we exclude respondents with homeschooled children to maintain consistency with our main analysis. We are left with a sample of 1,343 unique respondents for this robustness check. Descriptive statistics for wave 14 respondents can be seen in Appendix Table A.1. These statistics closely match descriptive statistics from our wave 15 sample presented in the main text in Table 1.

Changes to Analytic Strategy

We maintain the multinomial logit estimation strategy described in section 4 of our main paper, but make several changes to our sets of covariates due to questions not being asked in wave 14. Covariate sets for new specifications are shown below.

$$x_i' = \begin{Bmatrix} \text{race}_\text{i},\ \text{income}_\text{i},\ \text{education}_\text{i},\ \text{employed}_\text{i},\ \text{mediaTrust}_\text{i},\ \text{politics}_\text{i}, \\ \text{incidence}_\text{i},\ \text{caseFatalitiy}_\text{i},\ \text{state}_\text{i} \end{Bmatrix} \qquad (C2)$$

$$x_i' = \begin{Bmatrix} \text{race}_\text{i},\ \text{income}_\text{i},\ \text{education}_\text{i},\ \text{employed}_\text{i},\ \text{mediaTrust}_\text{i},\ \text{politics}_\text{i}, \\ \text{incidence}_\text{i},\ \text{caseFatalitiy}_\text{i},\ \text{exposure}_\text{i},\ \textit{state}_i \end{Bmatrix} \qquad (D2)$$

In particular, we exclude our measure of school quality in specifications C_2 and D_2 and controls for the type of school and modality choice in specification D_2. Our uncontrolled specification *A* and specification *B* with demographic controls and state fixed effects are unchanged. Definitions for variables remain unchanged from our initial paper. Although

this means that our learning options availability estimates and COVID-19 data slightly lag actual survey responses (by approximately 2 weeks), we do not believe this introduces significant noise to our estimates.

Results

As in our results for wave 15, we find that racial gaps are initially large and statistically significant, but become statistically insignificant with the inclusion of covariates, especially political leaning and measurements of local COVID-19 outbreaks. As in our main analysis, the inclusion of state fixed effects appears to be explaining much of the racial gap between white and Hispanic respondents with statistically significant differences between Black and white respondents persisting. For both in-person and remote learning modalities, we see that being a Trump voter, local outbreaks, and the estimated availability of learning modalities appear to have a large impact on the probability of attending via those modalities. Importantly, we do not observe a change in the direction of estimated average marginal effects (i.e., no positive estimates become negative in wave 14). We thus conclude that our estimates in the main paper are robust to the survey wave.

Interestingly, we find fewer statistically significant estimates when examining plausibility explanatory factors for hybrid learning modality. In fact, for specification C_2 we find no statistically significant estimates. In specification D_2, however, we find that being Black is associated with a 7.2 percentage point decrease in the probability of attending school via a hybrid learning modality as compared to being white. This estimate is significant at the 95% confidence interval. While this appears to be a significant deviation from the results of our primary analysis, we believe this result might be due to a Type 1 error. Given 29 separate estimated average marginal effects produced in our analyses for waves 14 and 15 and an $\alpha = 0.05$, we would expect to produce 1.45 such "false positives" among all estimated coefficients.

Table A.1.
Wave 14 Respondent Characteristics

	Overall *N=1343*	**White** *N=799*	**Black** *N=129*	**Hispanic** *N=316*	**Other Race** *N=98*	**P-Value**
Mode of Attendance						
In-Person	0.318	0.409	0.202	0.192	0.247	0.000
Remote Learning Only	0.554	0.434	0.726	0.704	0.660	0.000
Hybrid	0.129	0.158	0.073	0.104	0.093	0.028
Income						
Less than $40,000	0.336	0.253	0.568	0.335	0.501	0.000
$40,000-$100,000	0.411	0.436	0.352	0.457	0.159	0.000
$100,000+	0.253	0.311	0.080	0.208	0.340	0.000
Education						
H.S. Degree or Less	0.343	0.334	0.400	0.346	0.246	0.287
Some Postsecondary	0.187	0.162	0.226	0.232	0.153	0.190
Degree Earned	0.470	0.504	0.374	0.422	0.601	0.014
Voter Intentions						
Undecided Voter	0.491	0.456	0.534	0.563	0.468	0.176
Trump Voter	0.272	0.384	0.034	0.160	0.201	0.000
Biden Voter	0.237	0.161	0.432	0.278	0.331	0.000
Learning Supply						
In-Person Preferred	0.103	0.114	0.081	0.110	0.034	0.020
Hybrid Highly Preferred	0.283	0.177	0.445	0.416	0.381	0.000
Remote Learning Only	0.575	0.646	0.558	0.445	0.421	0.000
Employed	0.682	0.706	0.675	0.631	0.671	0.457
Media Trust	2.084	2.006	2.172	2.112	2.469	0.000
Incidence Rate	0.020	0.017	0.027	0.022	0.022	0.000
Case-Fatality Rate	0.028	0.027	0.027	0.028	0.030	0.967

Note: Sample restricted to respondents with school-aged children enrolled in a public, private, or charter school and attending via remote, hybrid, or in-person learning. Sampling weights used. P-values are the result of an adjusted Wald test of statistical significance.

Table A.2.

Average Marginal Effects – In-Person Modality (wave 14)

	(A)		(B)		(C_2)		(D_2)	
	AME	**Std. Error**	**AME**	**Std. Error**	**AME**	**Std. Error**	**AME**	**Std. Error**
Race: Black	-0.217***	0.047	-0.164***	0.045	-0.058	0.064	-0.020	0.067
Race: Hispanic	-0.214***	0.047	-0.080	0.054	-0.046	0.061	-0.073	0.064
Race: Other	-0.159**	0.072	-0.093	0.063	-0.008	0.083	-0.027	0.080
Employed			0.045	0.036	0.048	0.040	0.038	0.042
Media Trust					-0.020	0.034	-0.005	0.037
Trump Voter					0.110**	0.045	0.105**	0.045
Biden Voter					-0.038	0.045	-0.040	0.047
Incidence Rate					-6.303***	2.092	-7.089***	2.173
Case Fatality Rate					2.269**	1.027	2.254**	1.059
In-Person Highly Preferred							0.185***	0.071
Hybrid Highly Preferred							0.095	0.062
Remote Learning Only							0.005	0.076
Demographic Controls	N		Y		Y		Y	
State Fixed Effects	N		Y		Y		Y	
McFadden's Pseudo R^2	0.040		0.221		0.230		0.258	

Sampling weights used. Demographic controls include income, education, and employment. **** p<.01, ** p<.05, p<.1.*

Table A.3.

Average Marginal Effects – Remote Modality (wave 14)

	(A)		**(B)**		**(C_2)**		**(D_2)**	
	AME	**Std. Error**	**AME**	**Std. Error**	**AME**	**Std. Error**	**AME**	**Std. Error**
Race: Black	0.300***	0.051	0.218***	0.049	0.102	0.065	0.093	0.066
Race: Hispanic	0.263***	0.051	0.085	0.054	0.105*	0.063	0.117*	0.064
Race: Other	0.254***	0.074	0.107	0.072	0.041	0.094	0.025	0.090
Employed			-0.092***	0.036	-0.092**	0.041	-0.075*	0.042
Media Trust					0.046	0.032	0.041	0.036
Trump Voter					-0.114***	0.044	-0.100**	0.044
Biden Voter					0.040	0.051	0.058	0.049
Incidence Rate					8.166***	2.050	8.304***	2.078
Case Fatality Rate					-1.572	1.071	-1.483	1.083
In-Person Highly Preferred							-0.176**	0.077
Hybrid Highly Preferred							-0.122*	0.063
Remote Learning Only							0.034	0.077
Demographic Controls	N		Y		Y		Y	
State Fixed Effects	N		Y		Y		Y	
McFadden's Pseudo R^2	0.040		0.221		0.230		0.258	

Sampling weights used. Demographic controls include income, education, and employment. **** p<.01, ** p<.05, * p<.1.*

Table A.4.

Average Marginal Effects – Hybrid Modality (wave 14)

	(A)		**(B)**		**(C_2)**		**(D_2)**	
	AME	**Std. Error**	**AME**	**Std. Error**	**AME**	**Std. Error**	**AME**	**Std. Error**
Race: Black	-0.083***	0.032	-0.054	0.033	-0.044	0.045	-0.072**	0.036
Race: Hispanic	-0.049	0.036	-0.006	0.044	-0.059	0.046	-0.044	0.047
Race: Other	-0.095***	0.036	-0.014	0.056	-0.034	0.072	0.002	0.081
Employed			0.048*	0.028	0.044	0.032	0.037	0.031
Media Trust					-0.026	0.023	-0.036	0.023
Trump Voter					0.005	0.031	-0.005	0.030
Biden Voter					-0.003	0.040	-0.018	0.037
Incidence Rate					-1.863	1.657	-1.215	1.648
Case Fatality Rate					-0.698	0.847	-0.771	0.783
In-Person Highly Preferred					-0.044	0.045	-0.009	0.073
Hybrid Highly Preferred							0.027	0.048
Remote Learning Only							-0.038	0.064
Demographic Controls	N		Y		Y		Y	
State Fixed Effects	N		Y		Y		Y	
McFadden's Pseudo R^2	0.040		0.221		0.230		0.258	

Sampling weights used. Demographic controls include income, education, and employment. **** p<.01, ** p<.05, * p<.1.*

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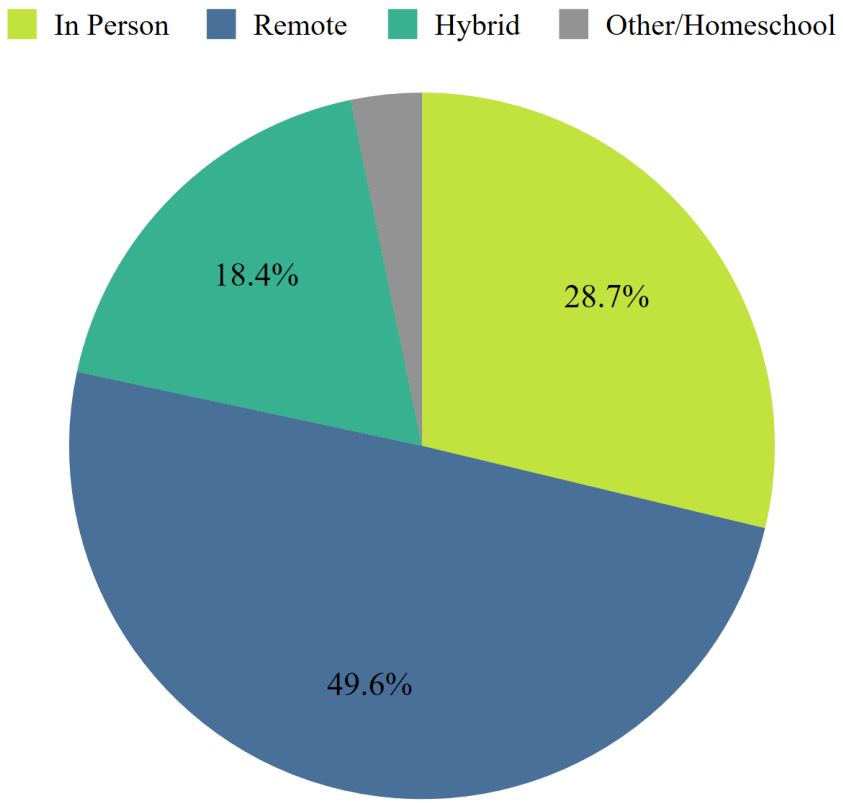
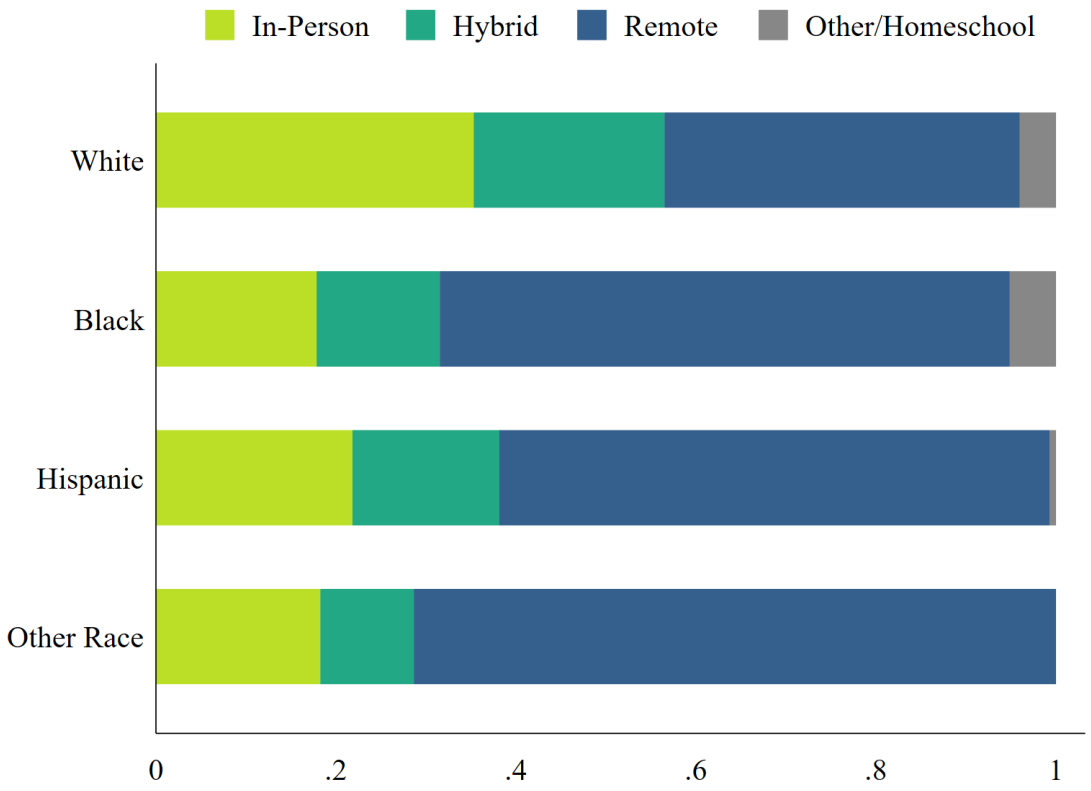
Figure 1A – Learning Modality Choices (UCA wave 15)



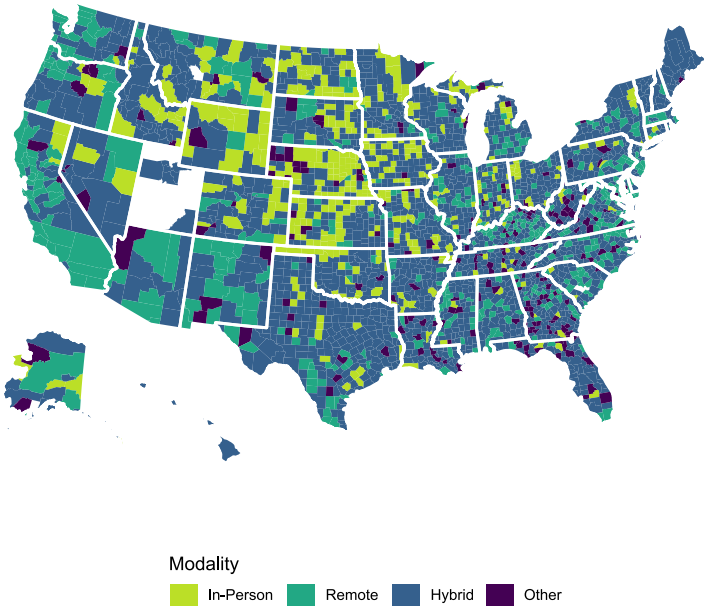
Note: Results weighted using population weights to the CPS benchmarks.

Figure 1B – Learning Modality by Race (UCA Wave 15)



Note: Results weighted using population weights to the CPS benchmarks.

Figure 2 – School Reopening Plans by County (as of October 30th, 2020)



Source: Authors' calculations using MCH Strategic Data and information from the U.S. Census Bureau

Table 1

Wave 15 Respondent Characteristics

	Overall *N=1316*	**White** *N=839*	**Black** *N=126*	**Hispanic** *N=264*	**Other Race** *N=86*	**P-Value**
Mode of Attendance						
In-Person	0.305	0.377	0.186	0.223	0.191	0.000
Remote Learning Only	0.497	0.392	0.664	0.604	0.737	0.000
Hybrid	0.198	0.231	0.149	0.173	0.072	0.001
Income						
Less than $40,000	0.318	0.251	0.570	0.307	0.409	0.000
$40,000-$100,000	0.421	0.432	0.358	0.487	0.204	0.001
$100,000+	0.261	0.318	0.072	0.207	0.387	0.000
Education						
H.S. Degree or Less	0.366	0.370	0.416	0.348	0.240	0.201
Some Postsecondary	0.180	0.145	0.235	0.250	0.127	0.026
Degree Earned	0.455	0.486	0.349	0.402	0.633	0.004
Voter Intentions						
Undecided Voter	0.486	0.448	0.491	0.584	0.523	0.091
Trump Voter	0.286	0.398	0.050	0.151	0.172	0.000
Biden Voter	0.228	0.154	0.459	0.265	0.305	0.000
School Type						
Public School	0.885	0.888	0.930	0.852	0.874	0.253
Charter School	0.055	0.037	0.059	0.091	0.087	0.200
Private School	0.060	0.075	0.011	0.057	0.038	0.000
Learning Supply						
In-Person Preferred	0.102	0.105	0.079	0.124	0.039	0.188
Hybrid Highly Preferred	0.259	0.187	0.354	0.362	0.381	0.000
Remote Learning Only	0.620	0.660	0.639	0.530	0.510	0.030
Employed	0.689	0.694	0.722	0.660	0.682	0.809
School Quality	4.417	4.428	4.199	4.489	4.556	0.005
Media Trust	2.025	1.931	2.126	2.134	2.325	0.000
Incidence Rate	0.020	0.017	0.027	0.024	0.022	0.000
Case-Fatality Rate	0.027	0.026	0.028	0.026	0.033	0.543
School Gave Choice	0.713	0.734	0.725	0.660	0.684	0.497

Note: Sample restricted to respondents with school-aged children enrolled in a public, private, or charter school and attending via remote, hybrid, or in-person learning. Sampling weights used. P-values are the result of an adjusted Wald test of statistical significance.

Table 2

Average Marginal Effects – In-Person Modality

	(A)		(B)		(C)		(D)	
	AME	**Std. Error**	**AME**	**Std. Error**	**AME**	**Std. Error**	**AME**	**Std. Error**
Race: Black	-0.190***	0.046	-0.189***	0.044	-0.149**	0.066	-0.100	0.077
Race: Hispanic	-0.154***	0.048	-0.054	0.056	-0.006	0.069	-0.039	0.064
Race: Other	-0.186***	0.068	-0.088	0.076	-0.062	0.098	-0.010	0.090
Employed			0.052	0.036	0.054	0.039	0.017	0.041
School Quality					0.045*	0.025	0.031	0.025
Media Trust					-0.045	0.031	-0.030	0.030
Trump Voter					0.124***	0.043	0.101**	0.041
Biden Voter					-0.060	0.046	-0.021	0.045
Incidence Rate					-4.458**	2.235	-3.832	2.540
Case Fatality Rate					0.219	1.009	-0.159	0.916
Charter School							-0.076	0.067
Private/Religious School							0.410***	0.047
Given Choice of Modality							0.147***	0.043
In-Person Highly Preferred							0.196**	0.079
Hybrid Highly Preferred							-0.059	0.058
Remote Learning Only							-0.149**	0.074
Demographic Controls	N		Y		Y		Y	
State Fixed Effects	N		Y		Y		Y	
McFadden's Pseudo R^2	0.033		0.235		0.278		0.357	

Sampling weights used. Demographic controls include income, education, and employment.

**** p<.01, ** p<.05, * p<.1*

Table 3

Average Marginal Effects – Remote Modality

	(A)		(B)		(C)		(D)	
	AME	**Std. Error**	**AME**	**Std. Error**	**AME**	**Std. Error**	**AME**	**Std. Error**
Race: Black	0.272***	0.055	0.252***	0.055	0.175**	0.068	0.120*	0.071
Race: Hispanic	0.212***	0.053	0.052	0.053	0.037	0.060	0.041	0.061
Race: Other	0.345***	0.073	0.145*	0.086	0.110	0.102	0.042	0.089
Employed			-0.104***	0.036	-0.105***	0.038	-0.068	0.043
School Quality					-0.035	0.025	-0.005	0.026
Media Trust					0.012	0.029	0.004	0.029
Trump Voter					-0.145***	0.042	-0.131***	0.041
Biden Voter					0.070	0.050	0.043	0.050
Incidence Rate					8.817***	2.100	8.254***	2.316
Case Fatality Rate					-2.578**	1.058	-1.890*	1.027
Charter School							0.085	0.072
Private/Religious School							-0.263***	0.046
Given Choice of Modality							-0.158***	0.039
In-Person Highly Preferred							-0.082	0.091
Hybrid Highly Preferred							0.014	0.061
Remote Learning Only							0.180**	0.073
Demographic Controls	N		Y		Y		Y	
State Fixed Effects	N		Y		Y		Y	
McFadden's Pseudo R^2	0.033		0.235		0.278		0.357	

Sampling weights used. Demographic controls include income, education, and employment.

**** p<.01, ** p<.05, * p<.1*

Table 4

Average Marginal Effects – Hybrid Modality

	(A)		(B)		(C)		(D)	
	AME	**Std. Error**	**AME**	**Std. Error**	**AME**	**Std. Error**	**AME**	**Std. Error**
Race: Black	-0.082*	0.044	-0.063	0.044	-0.026	0.057	-0.020	0.054
Race: Hispanic	-0.059	0.043	0.002	0.051	-0.031	0.054	-0.002	0.055
Race: Other	-0.159***	0.040	-0.057	0.065	-0.049	0.073	-0.031	0.072
Employed			0.052	0.034	0.051	0.036	0.051	0.036
School Quality					-0.010	0.022	-0.026	0.021
Media Trust					0.033	0.023	0.026	0.024
Trump Voter					0.021	0.036	0.031	0.036
Biden Voter					-0.010	0.040	-0.023	0.038
Incidence Rate					-4.359**	1.966	-4.422**	2.044
Case Fatality Rate					2.359***	0.903	2.049**	0.914
Charter School							-0.009	0.074
Private/Religious School							-0.148***	0.026
Given Choice of Modality							0.011	0.035
In-Person Highly Preferred							-0.115	0.113
Hybrid Highly Preferred							0.046	0.058
Remote Learning Only							-0.031	0.074
Demographic Controls	N		Y		Y		Y	
State Fixed Effects	N		Y		Y		Y	
McFadden's Pseudo R^2	0.033		0.235		0.278		0.357	

Sampling weights used. Demographic controls include income, education, and employment.
**** p<.01, ** p<.05, * p<.1.*