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# Extending Understanding of the Relationship Between School District COVID-19 Reopening Plan Signals and Enrollment Decline

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**Abstract:** Preceding the 2020-21 school year, school districts engaged their communities by sharing pandemic school reopening plans, outlining the learning modalities and support services to be made accessible to students. Existing research has highlighted a connection between a district's primary reopening method and changes in student enrollment—a crucial aspect for gauging responsiveness to different learning environments. Conversely, limited research has established the relationship between new health and safety procedures, provisions for vulnerable students, learning support services, or the level of community engagement undertaken by a district in creating reopening plans and student enrollment change, independent of the method of

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reopening (e.g., in-person or distanced). We do so using two methodological approaches. First, we use differences-in-differences approaches to estimate the impact of reopening method on enrollment changes. Second, we leverage granular data of reopening plans for a representative sample of Missouri school districts in a triple-differences approach. We find that signaling the intent to begin the school year with distanced instruction generated a 3% decline in enrollment beyond pandemic-era declines, concentrated among the youngest students. Extending existing reopening findings, we also estimate that enrollment declined an additional 5% in middle schools where districts did not require masking.
**Keywords**: PK-12 education; COVID-19 pandemic; reopening; enrollment; masking

**Ampliar la comprensión de la relación entre las señales del plan de reapertura COVID-19 de los distritos escolares y la disminución de las inscripciones**

**Resumen:** Antes del año escolar 2020-21, los distritos escolares involucraron a sus comunidades compartiendo planes de reapertura de escuelas pandémicas, describiendo las modalidades de aprendizaje y los servicios de apoyo que se pondrían a disposición de los estudiantes. Las investigaciones existentes han destacado una conexión entre el método de reapertura primaria de un distrito y los cambios en la inscripción de estudiantes—un aspecto crucial para medir la capacidad de respuesta a diferentes entornos de aprendizaje. Por el contrario, una investigación limitada ha establecido la relación entre los nuevos procedimientos de salud y seguridad, las disposiciones para estudiantes vulnerables, los servicios de apoyo al aprendizaje o el nivel de participación comunitaria emprendido por un distrito en la creación de planes de reapertura y el cambio en la inscripción de estudiantes, independientemente del método de reapertura (ej., en persona o a distancia). Lo hacemos utilizando dos enfoques metodológicos. Primero, utilizamos enfoques de diferencias en diferencias para estimar el impacto del método de reapertura en los cambios de inscripción. En segundo lugar, aprovechamos datos granulares de los planes de reapertura para una muestra representativa de distritos escolares de Missouri en un enfoque de triple diferencia. Encontramos que señalar la intención de comenzar el año escolar con instrucción a distancia generó una disminución del 3% en la inscripción más allá de las disminuciones de la era de la pandemia, concentrada entre los estudiantes más jóvenes. Ampliando los hallazgos de reapertura existentes, también estimamos que la inscripción disminuyó un 5 % adicional en las escuelas intermedias donde los distritos no exigían el uso de mascarillas.
**Palabras-clave:** educación PK-12; pandemia de COVID-19; reapertura; inscripción; enmascaramiento

**Ampliando a compreensão da relação entre os sinais do plano de reabertura COVID-19 do distrito escolar e o declínio nas matrículas**

**Resumo:** Antes do ano letivo de 2020-21, os distritos escolares envolveram suas comunidades compartilhando planos de reabertura de escolas pandêmicas, delineando as modalidades de aprendizagem e os serviços de apoio a serem disponibilizados aos alunos. A investigação existente destacou uma ligação entre o método primário de reabertura de um distrito e as mudanças nas matrículas de alunos—um aspecto crucial para avaliar a capacidade de resposta a diferentes ambientes de aprendizagem. Por outro lado, pesquisas limitadas estabeleceram a relação entre novos procedimentos de saúde e segurança, disposições para estudantes vulneráveis, serviços de apoio à aprendizagem ou o nível de envolvimento comunitário assumido por um distrito na criação de planos de reabertura e alterações nas matrículas de estudantes, independentemente do método de reabertura (por

exemplo, presencialmente ou à distância). Fazemos isso usando duas abordagens metodológicas. Primeiro, usamos abordagens de diferenças em diferenças para estimar o impacto do método de reabertura nas mudanças nas matrículas. Em segundo lugar, aproveitamos dados granulares de planos de reabertura para uma amostra representativa dos distritos escolares do Missouri numa abordagem de três diferenças. Descobrimos que sinalizar a intenção de iniciar o ano letivo com ensino à distância gerou um declínio de 3% nas matrículas, além dos declínios da era pandêmica, concentrado entre os alunos mais jovens. Ampliando as conclusões existentes sobre a reabertura, também estimamos que as matrículas diminuíram mais 5% nas escolas secundárias onde os distritos não exigiam máscara.
**Palavras-chave:** educação PK-12; pandemia do COVID-19; reabertura; inscrição; mascarar

## Extending Understanding of the Relationship Between School District COVID-19 Reopening Plan Signals and Enrollment Decline

Before the COVID-19 pandemic, national public-school enrollment increased slowly and steadily for decades, averaging about a 1% increase each year (Wang et al., 2019). In the years that followed the shock of the initial pandemic-induced school closure, however, the long-held trend in national student enrollment shifted significantly. Starting in the first full pandemic year and continuing into the second, public school enrollment dropped by a staggering 2% nationally and 3% in Missouri (Diemer et al., 2022). Nationally, public schools began the 2020-21 school year with nearly one million fewer students than the previous year; Missouri experienced a public-school enrollment decline of nearly 30,000 students, an amount roughly equivalent to the combined total enrollment of the St. Louis and Kansas City public school districts (Diemer & Park, 2022).

As students disenroll, new challenges may compound pandemic-era learning disruptions. Financially, lower overall revenues due to lower enrollment and soon-to-expire federal pandemic-era aid may force districts to cut jobs and benefits. For those students who return, idiosyncratic pandemic experiences likely will challenge re-acclimation into the classroom (Dee et al., 2023). Moreover, questions remain about the type, quality, and amount of learning students outside the traditional classroom received (Goldhaber et al., 2022; Oster, 2020). Without access to brick-and-mortar buildings, many students lost access to critical support services beyond academic instruction. In Missouri and elsewhere, access to school meals was strained, dramatically increasing child food insecurity (Jabbari et al., 2021) and, at the time, there remained limited understanding of the timeline to achieve a vaccine. A weak technological infrastructure failed to support many students who were forced to learn remotely. These types of pandemic-era service disparities were often the greatest for students from high-poverty districts (Donaldson et al., 2021).

A rapidly growing body of literature strongly suggests that the pandemic has had an immediate, strong, and negative impact on expected student learning growth, possibly larger for students exposed to longer periods of remote learning (Goldhaber et al., 2022. Currently, however, there is limited evidence on why and how parents and families decided to keep their children home from school. Some recent work has linked district-mandated distanced learning to significant decreases in student enrollment (Dee et al., 2023). Nonetheless, given the cacophony of correspondence from schools to local families and the overwhelming media (and political) attention devoted to school reopening, parental decisions may have been based, more granularly, on the context of the services, resources, and precautions offered by their districts.

To properly attend to family needs, it is important to understand the range of changes parents may demand as a part of their district's response to the lasting impacts of the pandemic on learning—including requiring masks as waves of the virus continue to circle the nation or efforts to maintain a healthy, equitable, and productive learning environment even if outside of the classroom. To inform ongoing district efforts to engage with family preferences, in this paper, we leverage detailed records of school reopening policies and service provisions for a representative sample of Missouri districts to dissect reopening at a finer level than has been achieved in the extant literature. To date, minimal research has assessed the impact of specific reopening policies on district changes in enrollment that does not attribute all change to district in-person, virtual, or hybrid instructional choices. School reopening is complex and, often, a general method of school reopening does not fully encapsulate the planning process or daily school-level changes, any of which may or may not have influenced parents and students to disenroll from their local public schools.

Overall, our findings are consistent with previous estimates (Dee et al., 2023), indicating that distanced learning reopening approaches resulted in an additional and significant loss in student enrollment beyond the pandemic's average impact for all schools, declines concentrated within kindergarten and pre-kindergarten. We further discuss school reopening procedures by providing evidence of the impact of additional district policies.

Specifically, we ask:

1) What impact did the signal of district reopening plans have on pandemic era student enrollment?
2) What is the independent effect of specific reopening attributes, such as masking policies and support services, on enrollment changes, beyond the primary method of reopening (e.g., in-person or distanced learning)? and
3) What are the heterogeneous effects of reopening plans across races/ethnicities and grade bands?

We find: 1) a significant and negative impact of a lack of masking requirements on enrollment for middle school students; and 2) districts engaged with their communities on the reopening process experienced a smaller enrollment decline than low-proactivity districts. Proactive districts solicited and used feedback from families, public health officials, and other organizations when forming reopening plans. These districts communicated clear plans about intended changes to instruction or mitigation strategies if there were changes to community COVID-19 risk levels and may have offered different instructional modes to different grade levels based on the perceived educational and health needs of younger and older students. We further disaggregate our findings by examining impacts by race and by grade. Our results suggest that: 3) White student enrollment declines were relatively greater in distanced districts, indicating that Black families may have had fewer alternative schooling options or may have preferred distanced instruction.

Currently, there is limited evidence on why and how parents and families decided to keep their children home from school, an understanding critical to informing how to support those students in the years to come (Dee et al., 2023). Our evaluation deepens our understanding of the role of reopening policies in producing enrollment changes and informs response to the negative impact on student learning resulting from the pandemic (Goldhaber et al., 2022).

**Missouri's Pandemic Landscape**

Missouri's state leadership typically prioritizes local district autonomy; as such, there was limited governmental oversight of school reopening strategy following the onset of the pandemic, instead opting to allow districts sovereignty in reopening decisions (Mahnken, 2020). This stands in contrast to some of Missouri's border states like Kansas, which signed legislation requiring all

districts to offer an in-person option. While Missouri's Department of Elementary and Secondary Education did release reopening guidelines, instructional decisions remained in the hands of district leaders. Missouri has a very diverse landscape of districts, including large urban districts around the metropolitan areas of St. Louis or Kansas City, though roughly half of all Missouri PreK-12 students live outside of these regions. The challenges of urban and rural districts often are unique, and universal requirements may not appropriately address both urban areas where food insecurity is often high or rural areas where technological infrastructure may be insufficient to support distanced learning (Diemer & Park, 2022).

As for what changed in Missouri schools during the pandemic, in a typical year, Missouri's public schools enroll nearly 920,000 students (pre-K through 12th grade), with fluctuations over the past decade hovering around one-tenth of 1% year-to-year (Diemer et al., 2022). Like much of the rest of the nation, however, Missouri's public schools experienced a rise in vacant student desks at the onset of the pandemic, amounting to approximately 3% of its total enrollment at the beginning of the 2020-21 school year, or 30,000 fewer students—again, roughly equivalent to the combined enrollment of Saint Louis and Kansas City Public Schools (National Center for Education Statistics, 2021).

Post-pandemic enrollment declines were concentrated primarily in pre-K and kindergarten, whereas between 2015 and 2019, pre-kindergarten enrollment in Missouri expanded by 3.4% per year (Diemer & Park, 2022). In the 2020-21 school year, Missouri's pre-K enrollment declined by 8,020 students, marking a 21% change from the prior school year; these declines alone account for approximately one-quarter of the statewide enrollment decline. Meanwhile, Grades 9–12 experienced a slight increase in student enrollment. In total, just over 2,000 more students enrolled in public high schools across Missouri during the 2020-21 school year, or a 0.8% increase compared to the national average of 0.4%. Grades one through eight experienced an overall 3% decline, mirroring national trends.

## Related Literature

Previous investigations of pandemic-era enrollment decline have linked learning delivery strategies (i.e., in-person or distanced) with subsequent enrollment changes, finding that districts opting for distanced education suffered from greater enrollment declines than those that maintained in-person instruction (Dee et al., 2023; Musaddiq et al., 2022). At the start of the 2020-21 school year, parents presented with distanced learning mandated by their districts may have disenrolled their students to instead pursue at-home learning approaches. Alternatively, parents may have chosen to withdraw their children from distanced-only districts and enroll their children in-person elsewhere if they believed in-person instruction to offer the highest quality education available and had the capacity to support their child's school transfer.[1]

While local and national school reopening conversations typically focused on the primary mode of reopening (i.e., distanced versus in-person), parents likely considered additional factors when making enrollment decisions (e.g., Cohen, 2020; Donaldson & Diemer, 2020; Reilly, 2020). Specifically, parents' decisions may have been based not solely on the offered mode of instruction but also on the signals contained in districts' publicly circulated reopening plans (Dee et al., 2023). Heterogeneity in policies such as student masking and resource provision (e.g., technology and device provision, meal service, etc.), even among districts with the same reopening method, may

[1] There is some reporting of student transfer (and, specifically, in St. Louis, where there is a robust private school ecosystem). However, our data preclude us from following student transfers into private schools, nor are reports of transferring enough to explain the statewide classroom exodus (Bernhard, 2020).

have driven some of the effects of reopening on disenrollment. Engaging with parents and the community during the creation of reopening plans was common, making it likely that the policies outlined in these reopening plans influenced parents' decision-making (Donaldson et al., 2021). Understanding differences in delivery, even within the same primary learning method, may help inform our understanding of the relationship between reopening mode and subsequent enrollment.

In the following literature review, we present findings on the relationship between primary reopening mode and enrollment. We then seek to contribute to this burgeoning literature by examining the policies and differences within reopening plans that may have contributed to parental decision-making. By and large, the extant literature strongly supports the notion that districts that transitioned into distanced learning environments suffered heavier enrollment losses than those that remained in-person. However, these studies (as well as national discussion) identify a number of other reopening decisions, the impact of which has yet to be understood fully. Informed by previous work, we extend beyond the method of learning/reopening with a granular heterogeneity analysis of complete district reopening plans by examining how the relationship between reopening mode and enrollment differs by race, grade band, and race-by-grade.

**Reopening Mode and Enrollment**

Of the limited empirical evidence examining the relationship between school-reopening methods and enrollment changes, Dee et al. (2023) warrants particular attention. The authors leverage a national sample of 800 districts' 2020-21 reopening data compiled by a third-party organization which collected district-level school reopening modes offered at each grade level. The data included district instructional modes from the most populous districts within the nation's most populous counties, other highly populated districts within highly populated counties, and a sample of remaining districts. Dee et al. (2023) pair state and national enrollment data with this reopening data, seven-day rolling average COVID-19 case rates at the county level, and other factors that varied at the state level and may have been connected to district reopening. Dee et al.'s (2023) findings indicate that offering remote-only instruction reduced subsequent enrollment, particularly in kindergarten. Further, while the greatest share of disenrollment took place in younger grades, these effects were less pronounced in contexts where some form of kindergarten enrollment is legally compulsory (kindergarten is required in Missouri).[2]

Using longitudinal student-level data from Michigan, Musaddiq et al. (2022) found that enrollment declines were largely explained by large increases in homeschooling. This was especially true in areas where local schools offered in-person education and speaks to the concerns parents might have harbored concerning sending their children to school in the early months of the pandemic, when information was limited. The authors indicate that conversations about enrollment choices were likely nuanced; however, much remains unknown about which factors ultimately influenced the decision to send a child to public school in person, keep them home, or find a different option altogether.

Dee et al. (2023) and Musaddiq et al. (2022) indicate that districts that implemented distance education encountered notable declines in enrollment when compared to districts continuing with in-person instruction. As the 2020-21 school year commenced, a subset of parents seemingly responded to districts' mandates for distance learning by choosing alternative at-home learning methods for their children. Alternatively, parents might have decided to transfer their children from

[2] Some research has discussed a trend amongst parents withholding their students from younger grades (where not required by law) until they are older. This has also been mentioned as a possible strategy in instances where parents opted to withdraw their child if the only educational options available were remote (Oster, 2021).

districts solely offering distance education to schools providing in-person instruction elsewhere. This latter perspective suggests that parents valued the perceived educational quality and support associated with in-person learning, prompting them to consider such transfers.

These analyses focus on the learning options made available to parents via the district but are also limited in that same regard. As previously discussed, reopening schools is a complex issue and one that may differ by community want and need. Our data, a representative sample of Missouri's districts (discussed in more detail below), allow insight into the reopening tendencies of wide range of districts, both large and small, and urban and rural (among other sizes and urbanicities). Our data provide enhanced insight into the wants and need of parents and students alike, particularly for those in vulnerable situations. Parents and students may have looked to districts to provide more than different learning options, but also to continue providing other critical services—things as simple as meals in some instances.

### *Differences in Instructional Mode and Enrollment by Race/Ethnicity*

Recent evidence indicates that student instructional mode experiences and enrollment decisions differed by student race and ethnicity. According to the Understanding Coronavirus in America (UCA) Tracking Survey, Black students were 15 percentage points less likely to attend school in-person in 2020-21 relative to White students (Camp & Zamarro, 2022). Similarly, an analysis of school district policy data found that Black, Hispanic, and Asian students were 15 percentage points more likely than White students to attend fully virtual districts (Smith & Reeves, 2020). In October 2020, 35% of White students were attending closed schools, compared with 51% of Black students, 60% of Hispanic students, and 65% of Asian students (Parolin & Lee, 2021).

There were also racial differences in access to in-person instruction. Half of White students had the option of in-person learning to start the 2020-21 school year, compared with 21% of Hispanic students and 25% of Black students (Belsha et al., 2021). Even when presented with a choice, Black parents were 20 percentage points less likely than White parents to choose in-person learning (Henderson et al., 2021). Many Black families opted out of public education altogether. The Census Bureau's Household Pulse Survey revealed that while homeschooling rates among White families increased by four percentage points (5.7% to 9.7%) from the spring to fall of 2020, homeschooling rates increased fivefold for Black families (from 3.3% to 16.1%; Eggleston & Fields, 2021). Guided by this research identifying racial trends in reopening, we further enhance our analysis by examining how the relationship between reopening mode and enrollment differs by race, grade band, and race-by-grade.

## Data and Sample

Our analyses lean on a combination of district-level enrollment and demographic data (obtained from the Missouri Department of Elementary and Secondary Education) and race-by-grade enrollment data (collected by the National Center for Education Statistics and retrieved from the Urban Institute Education Data Portal) for school years 2015-16 through 2020-21. We merge this district-level enrollment data with county-level seven-day normalized COVID-19 case rate data obtained from *The New York Times* pertaining to each district's first day of school in August or September 2020. Although evidence on the link between local case rates and reopening remains inconclusive, viral spread was one factor districts considered in their reopening decisions and may have factored into parent decision-making (DeAngelis & Makridis, 2021; Valant, 2020). Granular reopening data was collected by our research team from school district websites.

Our outcome of interest is the change in the natural log of school district enrollment, including enrollment by race/ethnicity. Given previous work identifying the concentration of

enrollment declines in the youngest grades, we also examine impacts by grade bands: pre-K/kindergarten, Grades 1-5, Grades 6-8, and Grades 9-12 (Dee et al., 2023, Diemer & Park, 2022).

Finally, the key piece to our analysis, we include detailed, district-specific reopening plan data (more detail on the sample, data collection, and verification of its accuracy can be found in Appendix A). Prior to the onset of the 2020-21 school year, we conducted a content analysis of Fall 2020 reopening plans for a representative sample of Missouri districts to understand the reopening factors districts considered and communicated to their stakeholders regarding their plans for the first day of school.[3] To construct our sample, we selected the highest-enrolled school district from each of the state's 114 counties, the St. Louis Public Schools district in St. Louis City, and an oversample of districts in the northern portion of St. Louis County (home to a large concentration of non-White residents) and the largest remaining counties statewide. In St. Louis City and Kansas City, we also randomly selected a sample of charter schools (the only municipal jurisdictions where charter schools operated in 2020-21). For additional information, see the Appendix, where we detail our data-gathering process and further describe the analytic sample.

In Table 1, we describe our sample of 191 traditional and charter public school districts, which serve about 586,000 students or two-thirds of Missouri's public-school population. Our sample's student demographic characteristics were reflective of the state's public school student population, with some slight differences likely due to oversampling in northern St. Louis County and charter schools, urban and suburban districts which serve higher proportions of students of color than districts in other parts of the state. We also note that very small districts in rural Missouri (e.g., the New York School District, which enrolls fewer than 20 students in grades P-12) have no incentive to publish a reopening plan online, particularly if contacting individual families and students is easier, thus making gathering plans from these districts difficult.

In Table 1, we include the results of *t*-tests across reopening modes, and we find that our sample aligns well with Missouri's student population. However, given our sampling method, our results have stronger validity in relation to districts of moderate to large size given the difficulty in capturing the reopening preferences of very low enrolled districts.

In Tables 2 and 3, we provide descriptive statistics based on the intended reopening modes identified through our content analysis. We coded four types of reopening modes: in-person only, in-person/distanced, distanced-only, and distanced/hybrid (Table 2).[4] Distanced only ($n = 40$), and hybrid ($n = 10$) districts had the largest average enrollment (Table 2). Distanced-only districts also had the highest weighted average shares of FRL-eligible students and students of color and were the most likely to be located in urban areas. In-person only ($n = 21$) districts served almost entirely White (94.4%) student populations and were exclusively located in rural areas or towns. The largest category of districts in our sample provided both in-person and distanced instruction ($n = 120$) and served approximately two-thirds of students in our sample (Table 3). These districts served predominately White student populations and were primarily located in town or rural areas. For our analysis, we collapse these four categories into "in-person" and "distanced." Distanced districts did not offer a fully in-person option to any or all students.

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[3] We verified the data to be accurate using multiple coders for each reopening document (some districts had several documents). We find that our inter-rater reliability suggest that coders were consistent across documents and we also find that reliability increased through re-appraisal of reopening documents. Please see our appendix for complete detail on how the sample was gathered.

[4] The three instructional modes are: 1) In-Person - students are physically present at school, receiving instruction from teachers onsite; 2) Distanced - students learn from home, either virtually or with paper packets; and 3) Hybrid - students receive a combination of in-person and distanced instruction.

**Table 1**

*Analytic Sample v. All Districts Statewide*

| Category | Sampled Districts ($n$ = 191) | All Districts ($n$ = 549) | One-Sample *T*-Test ($p$) |
|---|---|---|---|
| Reopening mode (DESE) | | | |
| In-person/Distanced | 45.0 | 47.4 | 0.511 |
| In-person only | 19.4 | 33.5 | 0.000 |
| Distanced only | 20.4 | 10.2 | 0.001 |
| Hybrid+ | 15.2 | 8.9 | 0.017 |
| Avg. enrollment (2019-20) | 3,196 | 1,592 | 0.000 |
| Avg. enrollment (2020-21) | 3,093 | 1,559 | 0.000 |
| Avg. enrollment (2021-22) | 3,123 | 1,567 | 0.000 |
| District demographics (2019-20)* | | | |
| Free/reduced-price lunch | 51.7 | 49.8 | 0.633 |
| White | 65.9 | 70.3 | 0.000 |
| Black | 18.8 | 16.9 | 0.082 |
| Hispanic | 8.2 | 7.4 | 0.164 |
| District urbanicity | | | |
| City | 18.8 | 8.4 | 0.000 |
| Suburb | 15.2 | 8.9 | 0.017 |
| Town | 31.4 | 16.9 | 0.000 |
| Rural | 34.6 | 65.8 | 0.000 |

*Note*: Reopening mode as reported to the Missouri Department of Elementary and Secondary Education (DESE). District enrollment and demographic data were obtained from DESE. Hybrid+ districts offered hybrid instruction to some or all students. Hybrid students attended in-person on some days and distanced on other days. Hybrid+ districts did not offer fully in-person instruction.
* Weighted by enrollment.

**Table 2**

*District Characteristics by Reopening Mode*

| Category | In-person/ Distanced (*n* =120) | In-person only (*n* = 21) | Distanced only (*n* = 40) | Hybrid+ (*n* = 10) |
|---|---|---|---|---|
| Avg. enrollment (2019-20) | 2,967 | 708 | 4,067 | 5,232 |
| Avg. enrollment (2020-21) | 2,913 | 688 | 3,937 | 5,011 |
| Avg. enrollment (2021-22) | 2,939 | 691 | 3,915 | 5,028 |
| District demographics (2019-20)* | | | | |
| Free/reduced-price lunch | 45.9 | 51.2 | 65.1 | 45.1 |
| White | 77.7 | 94.4 | 32.6 | 80.1 |
| Black | 6.4 | 0.8 | 49.2 | 6.5 |
| Hispanic | 7.8 | 1.8 | 10.0 | 6.0 |
| District urbanicity | | | | |
| City | 7.5 | 0.0 | 62.5 | 20.0 |
| Suburb | 11.7 | 0.0 | 35.0 | 10.0 |
| Town | 45.0 | 14.3 | 0.0 | 30.0 |
| Rural | 35.8 | 85.7 | 2.5 | 40.0 |
| Cases per 100k (first day of school) | 15.3 | 12.9 | 16.3 | 22.1 |

*Note*: *Weighted by enrollment.

There is a subtle, yet important, distinction between *observed* first-day reopening mode and *intended* first-day reopening mode as signaled in district plans. Our estimates capture the intent-to-treat (ITT) effect of the signal of district offerings rather than the treatment-on-the-treated effect of the actual first-day reopening mode. The ITT is important from a policy perspective because parents likely decided to enroll or disenroll their children before the first day of school based on the signals communicated via a reopening plan.

**Table 3**

*Content Analysis by Reopening Mode*

| Category | In-person/ Distanced (n =120) | In-person only (*n* = 21) | Distanced only (*n* = 40) | Hybrid+ (*n* = 10) |
|---|---|---|---|---|
| Total students served | 356,004 | 14,866 | 162,662 | 52,315 |
| Proactive planning | | | | |
| Solicited input and feedback | 94.2 | 76.2 | 97.5 | 100.0 |
| Tiered mitigation plans | 86.7 | 76.2 | 62.5 | 100.0 |
| Different modes by grade levels | 15.0 | 0.0 | 0.0 | 10.0 |
| Academic supports | | | | |
| To address learning loss | 15.8 | 9.5 | 32.5 | 30.0 |
| For students with disabilities | 70.8 | 42.9 | 72.5 | 90.0 |
| For English language learners | 20.0 | 9.5 | 42.5 | 20.0 |
| Health and safety | | | | |
| Changes to buildings or transportation | 99.2 | 100.0 | N/A | 100.0 |
| Masks required – students | 69.2 | 52.4 | N/A | 90.0 |
| Masks required – teachers | 77.5 | 47.6 | N/A | 100.0 |
| Services provided | | | | |
| Meals | 40.0 | 38.1 | 75.0 | 60.0 |
| Devices | 78.3 | 52.4 | 95.0 | 100.0 |
| Internet | 37.5 | 42.9 | 62.5 | 50.0 |

It is also worth noting that many schools may have *begun* the year using a reopening strategy that they altered subsequently. In our correspondence with districts and through our search, we found some such instances; however, due to the extensive and constant changes districts experienced and the challenge in accurately capturing those changes, we are unable to speak to the impact of changes throughout the school year or how districts changed their response due to evolving circumstances. Nonetheless, it is reasonable to assume that many, if not most, parents make the decision to enroll or disenroll their child prior to the beginning of the school year and, likely, considering the information provided via reopening plans. Instead, we captured the method

that districts employed on day one. Our analysis then, speaks only to the intended method of reopening, not necessarily how districts may have changed throughout the pandemic school year.

As a final note, given the geographic misalignment of school district and county boundaries in Missouri, we exclude county voting data. While there has been discussion of the relationship between political preference and reopening decisions (Valant, 2020), our data did not allow us to attribute specific voting preferences at the district-level (the level of our analysis), a shortcoming consistent with other similar studies to date (Dee et al., 2023).

## Empirical Approach

We estimate the relationship between district reopening mode signals and enrollment decline using a traditional difference-in-differences model. Our outcome of interest is the natural log of district pre-K through 12th-grade enrollment in the fall of the first full pandemic school year (2020-21).[5] We consider "distanced" education or, more specifically, the *signal* of distanced education, as our treatment relative to in-person education. Districts are considered distanced only if they signal that distanced education will be the first-day option for *all* students. Following Dee et al. (2023), we ultimately excluded charter schools and include enrollment data from 2015-16 through 2020-21.[6] This left 990 district-year observations for 137 in-person and 28 distanced districts (165 in total).

Difference-in-differences approaches assume the pre-intervention trends for the outcome of interest (i.e., enrollment) are parallel for the treatment (distanced) and comparison (in-person) groups. If this assumption holds, in-person districts can serve as a counterfactual for what would have happened with distanced districts in the absence of the treatment. In the post-treatment period, any change in the difference in the enrollment trends of these two groups can then be attributed to the district signaling that they would start the year with distanced instruction.

We find strong support for the parallel trends assumption (Figure 1). We further test the null hypothesis that the linear trends are parallel and fail to reject this hypothesis. In addition, we conduct graphical and statistical tests to check for any effect in anticipation of treatment and find no evidence of prior trends (Figure 2).

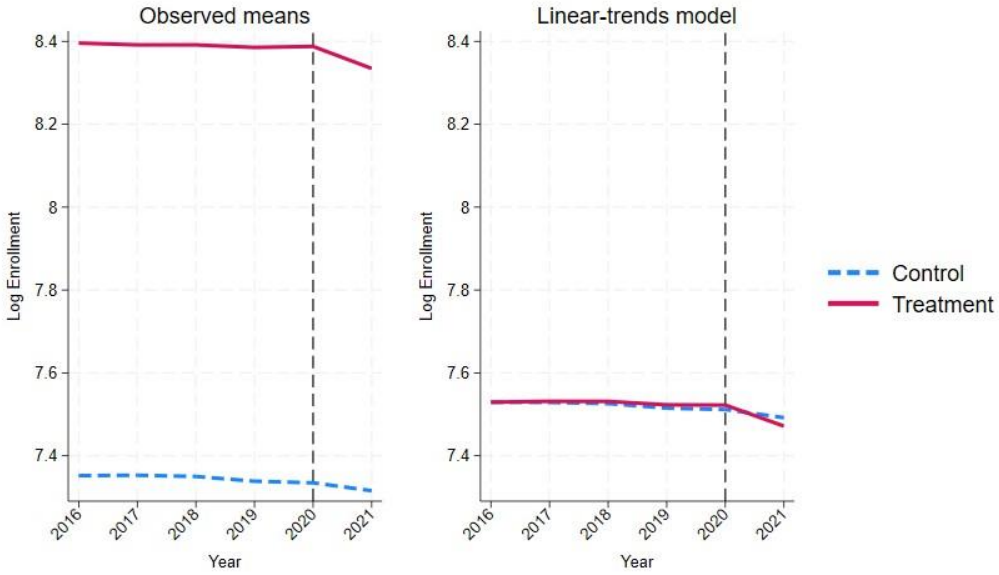
Next, we check whether treatment and comparison districts have parallel trends in log enrollment in each of four grade bands: pre-K/K, 1-5, 6-8, and 9-12. We exclude districts that were missing data for any or all grades in the corresponding grade bands between 2015-16 and 2020-21 to account for possible changes in enrollment due to structural changes in grades offered. In Missouri, this is often a result of district consolidation, and districts in the process of consolidation are in a fundamentally different state than the districts we chose to include. Following their exclusion, we find strong visual and statistical support for the parallel trends assumption and no evidence of prior trends in any of the four grade bands (Figure 3).

[5] Natural log is often used when modeling nonnegative, skewed dependent variables (Huber, 2019).

[6] We find visual and statistical evidence that the parallel trends assumption is violated when charter schools are included, even after accounting for non-structural changes in enrollment due to some charters adding grade levels during the pre-policy years. Thus, following Dee et al. (2023), we choose not to include charter schools in our analytic sample. Results of charter school models are available upon request.

**Figure 1**

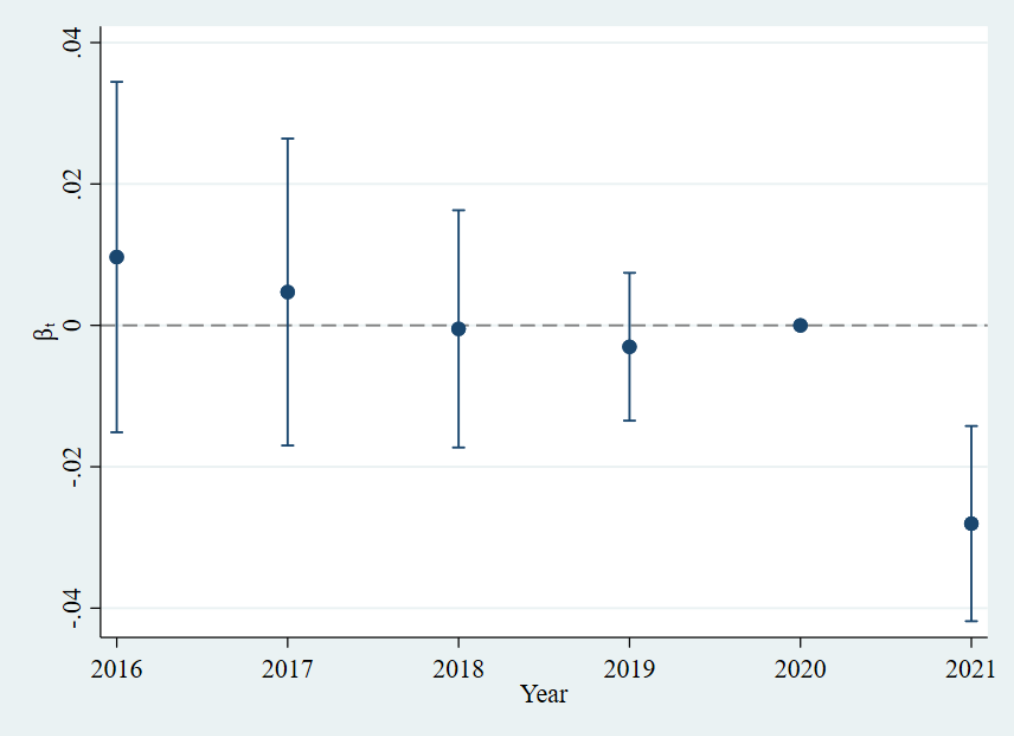
*District Enrollment Trends*




*Note*: There are 137 in-person districts and 28 distanced districts.

**Figure 2**

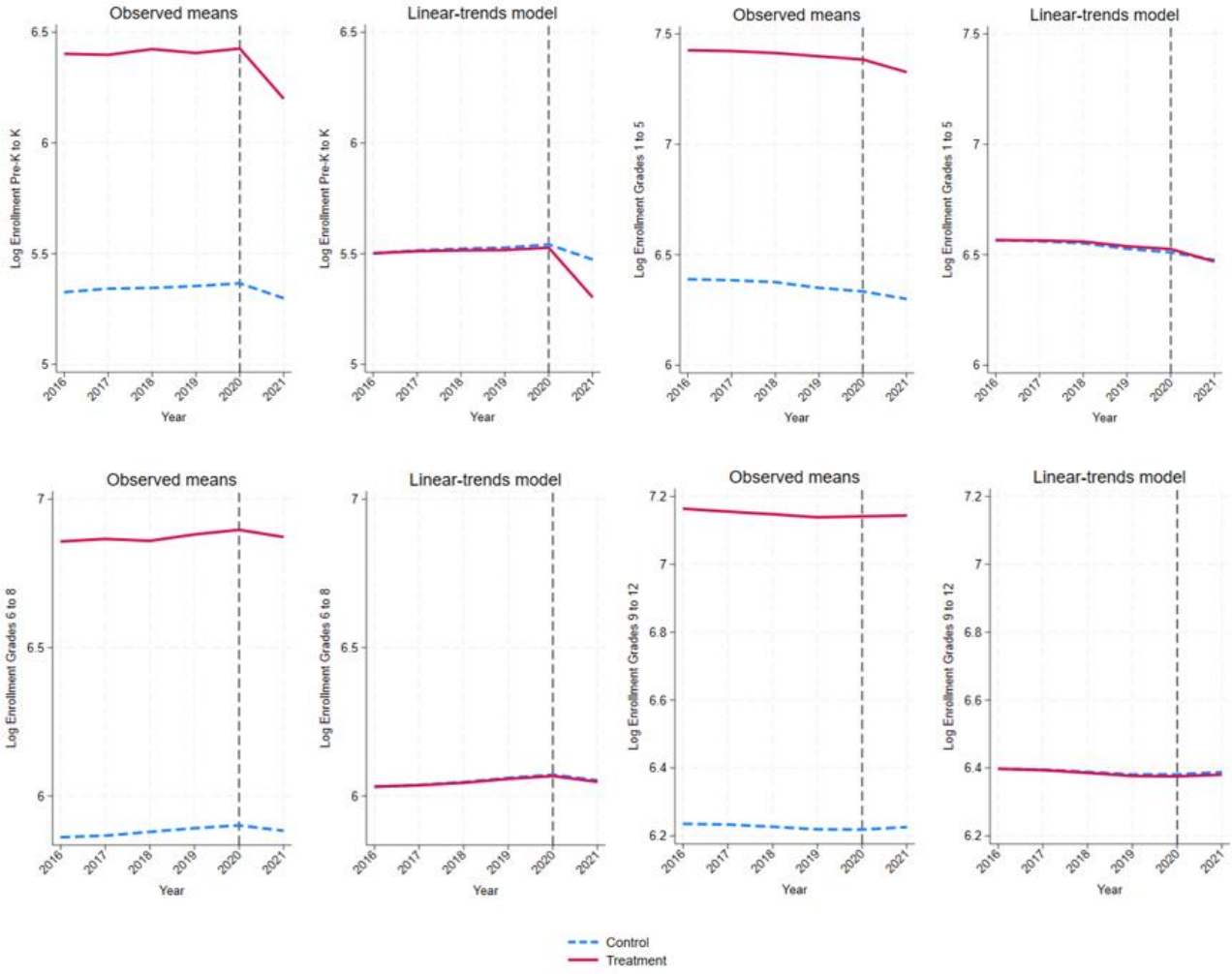
*Enrollment Event Study*




*Note*: There are 137 in-person districts and 28 distanced districts.

**Figure 3**

*Enrollment Trends, Fixed Grade Bands*

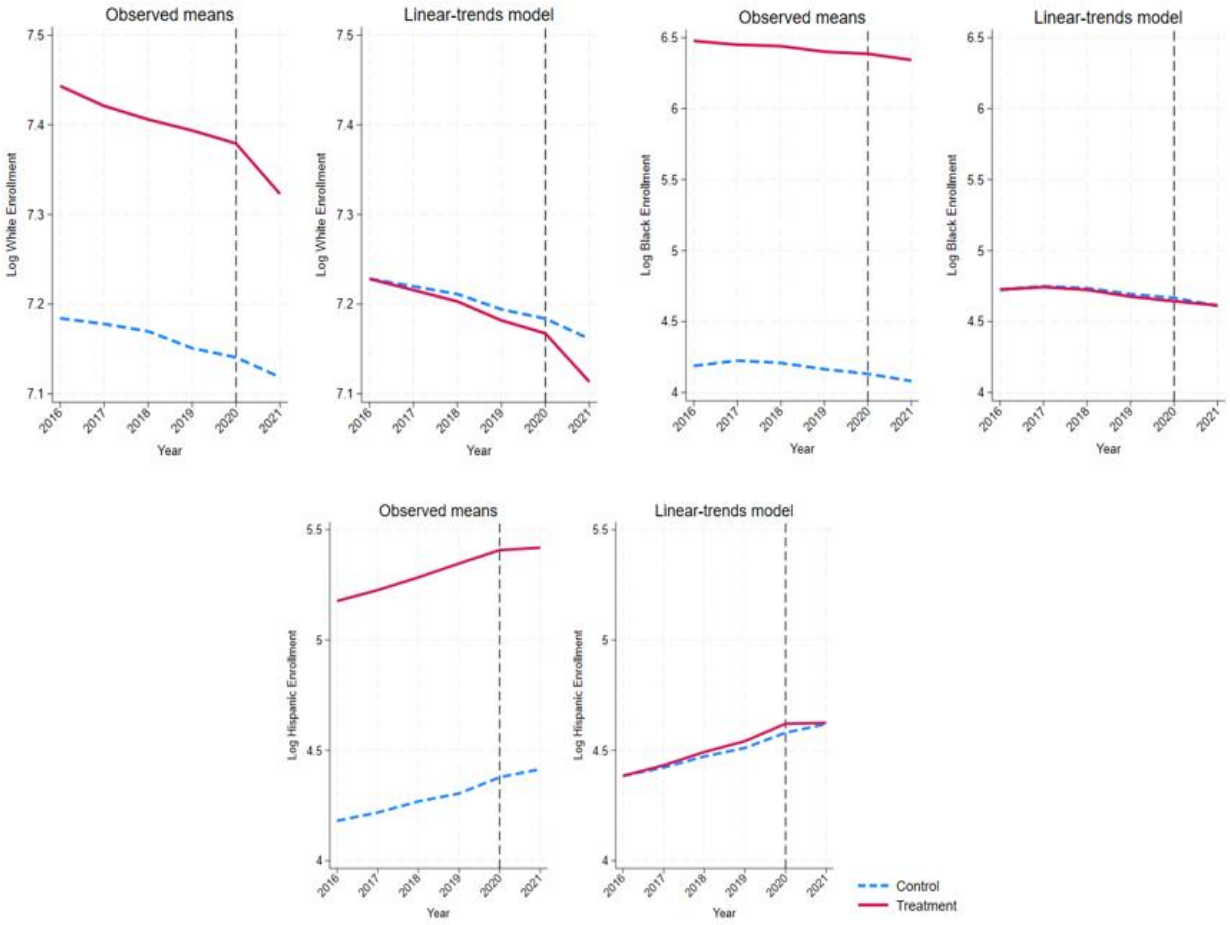



*Note*: Trends are graphed separately for Grades pre-K/K, 1-5, 6-8, and 9-12. Each graph excludes districts that were missing data for any or all grades in the corresponding grade band between 2015-16 and 2020-21.

Finally, we check whether treatment and comparison districts have parallel trends in log enrollment for White students, Black students, and Hispanic students. We find strong visual and statistical support for the parallel trends assumption and no evidence of prior trends in log enrollment for White students or Black Students (Figure 4). However, we can reject the null hypothesis of parallel trends (though only at the 0.1 level) for Hispanic students, thus we treat our findings concerning Hispanic students with caution.

**Figure 4**

*Enrollment Trends, by Race/Ethnicity*




*Note*: Trends are graphed separately for grades White, Black, and Hispanic students.

We estimate the following model comparing the change in log enrollment for in-person and distanced districts:

$$(1)\quad Y_{itc} = \beta_0 + \beta_1 Post_t + \beta_2 Dist_i + \beta_3 Post_t * Dist_i + \beta_4 Cases_c + \theta_i + \delta_t + \varepsilon_{itc}\ ,$$

where $Y_{itc}$ indicates log enrollment for district *i* in year *t* in county *c*, *Post* indicates the 2020-21 school year, and *Dist* indicates distanced instruction. We control for the 7-day normalized county-level COVID-19 case rate reported for each district's first day of school. In all models, we include district ($\theta$) and year ($\delta$) fixed effects. Standard errors are clustered at the district level.

We also identify high-proactivity and low-proactivity districts and compare whether enrollment declines differed between these two groups (Table 3).[7] We estimate a difference-in-differences model comparing enrollment changes in high- and low-proactivity districts:

[7] We assign districts one point for each of the three indicators (soliciting and using feedback, offering different instructional modes at different grade levels, and communicating intended changes if risk levels

$$(2)\ Y_{itc} = \beta_0 + \beta_1 Post_t + \beta_2 Low_i + \beta_3 Post_t * Low_i + \beta_4 Cases_c + \theta_i + \delta_t + \varepsilon_{itc}\ ,$$

where *Low* indicates low-proactivity and additional terms are defined as in the prior model.

We estimate a triple-differences model to examine the enrollment impacts for in-person districts that did not require students to wear masks. Triple-differences estimation is useful to isolate the treatment impact on a subset of treated units thought to be particularly sensitive to treatment conditions (Olden & Møen, 2022), as we posit no-masking districts were (Table 3).[8] By dividing in-person districts into those that did or did not require masking policies, we can explore overall treatment impacts more comprehensively by comparing changes over time across all three groups.

With traditional difference-in-differences, satisfying the parallel trends assumption is critical to establishing causal inference (Olden & Møen, 2022); however, for the purposes of this analysis, triple-differences estimation requires we satisfy that the relative outcome of the masking and no-masking districts in the distanced (treatment) group trends in the same way as the relative outcomes of masking and no-masking districts in the in-person (control) group (Olden & Møen, 2022). Therefore, we estimate the following model:

$$(2)\ Y_{itc} = \beta_0 + \beta_1 Post_t + \beta_2 InPerson_i + \beta_3 NoMasks_i + \beta_4 Post_t * InPerson_i + \beta_5 Post_t * NoMasks_i + \beta_6 InPerson_i * NoMasks_i + \beta_7 Post_t * InPerson_i * NoMasks_i + \beta_8 Cases_c + \theta_i + \delta_t + \varepsilon_{itc}\ ,$$

where *InPerson* indicates in-person instruction and *NoMasks* indicates no stated masking requirement for students.[9]

Following Dee et al. (2023), we supplement these analyses through robustness checks employing synthetic control methods which, unlike differences-in-differences, does not require satisfying the assumption that average outcomes of the treated and control units are parallel prior to the intervention period (Abadie & Gardeazabal, 2001). Using our donor pool of all non-distanced districts, we generate a counterfactual based on linear interactive fixed effects with time-varying

changed). We identify high-proactivity districts as those with two or three points ($n$=132) and low-proactivity districts as those with zero or one point ($n$=33). It could be that offering different instructional modes for different grade levels was a deterrent for some families if this was seen as inconvenient. However, within this construct we consider it to be an example of proactive consideration of varying risk levels and instructional needs for students of different age groups. This is supported by difference-in-differences results, where we find enrollment was three percentage points higher in districts that implemented different instructional plans for different grade levels relative to districts that offered the same instructional mode to all students. There were 18 districts in our analytic sample that offered different instructional modes for different grade levels, and 17 of these scored three out of three points on the proactivity construct. Seventy percent of districts in our analytic sample scored two out of three possible points.

[9] Forty-seven of the 137 in-person districts in our sample stated that masks would not be required, while 90 in-person districts included a student masking requirement in their reopening plans. Eight of the 28 distanced districts signaled an intention to require masks if students returned to campus for in-person instruction, while one stated that masks would not be required. Another 19 distanced districts did not address masks in their reopening plans. Many of these districts may have required masks had they returned to in-person learning. However, their plans did not signal an intention to require masks in the future, and parents concerned about student safety may have considered this when deciding whether to enroll their child in the district. Thus, for the purposes of our analysis, we identify all 20 distanced districts that stated masks would not be required or did not address masking as "no-mask" districts.

coefficients (Xu, 2017). Estimates represent the differences of the average treatment effect of the signal of distanced education on distanced districts compared to the counterfactual estimate.

# Results

## Difference-in-Differences

Our final analytical sample includes 990 district-year observations for 137 in-person districts and 28 distanced districts (165 in total) from the years 2015-16 through 2020-21. We find that districts that signaled an intent to switch to fully distanced or hybrid instruction for the start of the 2020-21 school year experienced an additional enrollment decline of 3% beyond the average impact of the pandemic (Table 4). Similar to previous research, we find that switching to distanced instruction led to an additional 28% decline in pre-K enrollment and a 9% decline in kindergarten enrollment.

**Table 4**

*Enrollment Change, by Grade Band*

| Category | PK-12 | PK | K | PK/K | 1-5 | 6-8 | 9-12 |
|---|---|---|---|---|---|---|---|
| *Post* | -0.040*** | -0.026 | -0.028 | -0.038 | -0.074*** | -0.014 | -0.021* |
| | (0.007) | (0.053) | (0.021) | (0.023) | (0.011) | (0.010) | (0.011) |
| *Post x Distanced* | -0.030*** | -0.279*** | -0.087*** | -0.159*** | -0.017 | 0.001 | -0.002 |
| | (0.010) | (0.077) | (0.026) | (0.030) | (0.015) | (0.011) | (0.011) |

*Note*: All models control for the 7-day average normalized case rate on each district's first day of school. ***$p$<0.01; **$p$<0.05; *$p$<0.1.

### *By Grade*

We run our model for each of four grade bands: pre-K/K, 1-5, 6-8, and 9-12 (Table 4). We exclude districts that were missing data for any or all grades in the corresponding grade bands between 2015-16 and 2020-21 to account for possible changes in enrollment due to structural changes in grades offered. In our sample, we had 18 traditional school districts that offered different instructional modes to different grade levels. This could potentially impact estimates for middle school and high school because some districts that offered in-person instruction to elementary school students (and were thus coded as in-person districts in our main analysis) only offered distanced or hybrid instruction for upper grades. For our by-grade analysis, we ran our model separately for each grade band, with districts coded according to the instructional modes offered at that grade level.

We find the pandemic itself (estimates of *Post*) had a highly significant effect on enrollment in Grades 1-5 (a decrease of 7%) and a marginal effect on enrollment in Grades 9-12 (a decrease of 2%) but did not significantly impact enrollment in pre-K/K or Grades 6-8 (Table 4). The estimate for Grades 9-12 approaches significance at the 0.05 level ($p$=0.054), and the pre-K/K estimate of a 4% decline approaches marginal significance ($p$=0.106). The effect of switching to distanced instruction (*Post x Distanced)*, however, was an additional statistically significant 16% decline in enrollment for pre-K and kindergarten. We examine effects separately for pre-K and K and do not

find evidence of statistically significant pandemic effects on enrollment for either grade. However, we find that switching to distanced instruction led to a 28% decline in pre-K enrollment and a 9% decline in K enrollment. Switching to distanced instruction had no additional effects on enrollment in Grades 1-5, 6-8, or 9-12. Overall, we find significant declines in enrollment in the post-period—regardless of instructional mode—in Grades 1-5 and 9-12.

### *By Race*

We examine heterogeneity by race (Table 5) and find the pandemic had a significant negative impact on both White student enrollment (a decrease of 5%) and Black student enrollment (20% decline) in fall 2020. Switching to distanced instruction led to an additional 4% decline in White student enrollment but had no additional effect on Black or Hispanic enrollment (though estimated with less precision for both groups).

**Table 5**

*Enrollment Change, by Race/Ethnicity*

| Category | Grades PK-12 | White Students | Black Students | Hispanic Students |
|---|---|---|---|---|
| *Post* | -0.040*** | -0.052*** | -0.200** | -0.041 |
| | (0.007) | (0.007) | (0.094) | (0.085) |
| *Post x Distanced* | -0.030*** | -0.042** | 0.069 | 0.030 |
| | (0.010) | (0.020) | (0.053) | (0.054) |

*Note*: All models control for the 7-day average normalized case rate on each district's first day of school. Estimates are constructed as the natural log of n+1 to account for real zeros in our data. ***$p$<0.01; **p<0.05; *$p$<0.1.

### *Race-by-Grade*

In our by-grade analysis, we find switching to distanced instruction led to an additional 16% decline in enrollment for pre-K and K students, driven by a 28% decline in pre-K enrollment (Table 4). In order to understand whether these declines were distributed evenly by race/ethnicity or were concentrated among particular student groups, we use data from the Urban Institute Education Data Portal to estimate race-by-grade effects. For this analysis, we classify districts as in-person or distanced based upon grade band-specific instructional offerings.

We find evidence that switching to distanced instruction at the elementary school level led to a 30% decline in Black pre-K enrollment and a 15% decline in White kindergarten enrollment (Table 6). Estimates of White and Hispanic pre-K enrollment declines when districts switched to distanced instruction do not reach statistical significance. Hispanic kindergarten enrollment increased 16% in the post-period, but districts that switched to distanced instruction experienced a 19% decline.

For Grades 1-5, we find an 8% decline in White student enrollment in the post-period, regardless of elementary-level instructional offerings. Estimates of Black and Hispanic enrollment declines in Grades 1-5 do not reach statistical significance. We also do not find statistically significant additional effects on White, Black or Hispanic enrollment in Grades 1-5 when districts switched to distanced instruction.

In middle school, we find a 3% decline in White student enrollment due to the pandemic. Our results suggest Black middle school enrollment declined 22% in the fall of 2020, but that this pandemic effect was canceled out in districts that switched to distanced instruction for middle school. Finally, we find evidence of a marginal decrease in White high school enrollment in the post-period (minus 2%) and estimates of an additional effect of switching to distanced instruction (minus 3%) approach marginal significance ($p$=0.107).

**Table 6**

*Enrollment Change, Race-by-Grade*

| Category | PK | K | 1-5 | 6-8 | 9-12 |
|---|---|---|---|---|---|
| | | | *White Students* | | |
| *Post* | -0.114 | -0.037 | -0.083*** | -0.026** | -0.020* |
| | (0.085) | (0.024) | (0.010) | (0.011) | (0.012) |
| *Post x Distanced* | -0.172 | -0.148*** | -0.036 | -0.025 | -0.030 |
| | (0.145) | (0.047) | (0.023) | (0.022) | (0.018) |
| | | | *Black Students* | | |
| *Post* | -0.049 | -0.084 | -0.101 | -0.216*** | -0.073 |
| | (0.084) | (0.052) | (0.070) | (0.059) | (0.080) |
| *Post x Distanced* | -0.300** | -0.009 | -0.060 | 0.216*** | 0.044 |
| | (0.124) | (0.064) | (0.087) | (0.063) | (0.063) |
| | | | *Hispanic Students* | | |
| *Post* | 0.132 | 0.160** | -0.021 | 0.038 | 0.098 |
| | (0.097) | (0.075) | (0.064) | (0.061) | (0.076) |
| *Post x Distanced* | -0.193 | -0.193** | 0.002 | 0.037 | -0.019 |
| | (0.130) | (0.097) | (0.069) | (0.057) | (0.050) |

*Note*: All models control for the 7-day average normalized case rate on each district's first day of school. Estimates are constructed as the natural log of n+1 to account for real zeros in our data. ***$p$<0.01; **$p$<0.05; *$p$<0.1.

### *The Importance of Demonstrating Proactive Planning*

We find enrollment decreased an additional 3% in the post-period in districts that did not clearly demonstrate proactive planning, regardless of instructional mode (Table 7). Enrollment declines in less-proactive districts were driven by 3% declines in Grades 1-5 and Grades 9-12. We have also included, in the Appendix, the results of a Generalized Synthetic Control model we implement to test the robustness of these findings—which largely aligns with these above results.

**Table 7**

*Enrollment Change, by Proactivity*

| Category | Grades PK-12 | Grades PK/K | Grades 1-5 | Grades 6-8 | Grades 9-12 |
|---|---|---|---|---|---|
| *Post* | -0.034*** | -0.026 | -0.065*** | -0.018* | -0.014 |
| | (0.007) | (0.025) | (0.011) | (0.010) | (0.011) |
| *Post x Low-Proactivity* | -0.025** | -0.056 | -0.034** | 0.017 | -0.027** |
| | (0.011) | (0.038) | (0.015) | (0.015) | (0.013) |

*Note*: All models control for the 7-day average normalized case rate on each district's first day of school. ***$p$<0.01; **$p$<0.05; *$p$<0.1.

## Triple-Differences

### *Impact of No Masking for In-Person Districts*

Our triple-differences estimation suggests that not requiring masks for in-person districts led to an additional 2% enrollment decline beyond pandemic-era declines, but this finding was not statistically significant (Table 8). However, not requiring masks in in-person districts led to a statistically significant 5% decline in enrollment for middle school students.

**Table 8**

*Enrollment Change, by In-Person, No-Masking, and Grade Band*

| Category | Grades PK-12 | Grades PK/K | Grades 1-5 | Grades 6-8 | Grades 9-12 |
|---|---|---|---|---|---|
| *Post* | -0.058*** | -0.160*** | -0.074** | -0.034 | -0.040** |
| | (0.015) | (0.056) | (0.034) | (0.023) | (0.019) |
| *Post x In-Person* | 0.031** | 0.122** | 0.014 | 0.033* | 0.026* |
| | (0.013) | (0.056) | (0.032) | (0.020) | (0.016) |
| *Post x No-Masking* | -0.015 | -0.045 | -0.021 | 0.017 | 0.008 |
| | (0.016) | (0.062) | (0.033) | (0.022) | (0.021) |
| *Post x In-Person x No-Masking* | -0.019 | 0.050 | -0.017 | -0.053** | -0.028 |
| | (0.018) | (0.067) | (0.035) | (0.025) | (0.025) |

*Note*: All models control for the 7-day average normalized case rate on each district's first day of school. Missing data on masking is coded as zero (no masking requirement). ***$p$<0.01; **$p$<0.05; *$p$<0.1.

As an alternative specification, we treat missing masking data as missing and rerun the analysis with the nine distanced districts that mention masking policies in their plans (Table 9).[10] With this specification, we find that enrollment declined 10% in in-person districts that did not require masks. The impact of not requiring masks was a further 10% decline in Grades 1-5, a 7%

[10] In our preferred specification we code missing data on masking as zero (no masking requirement) given that our measurements capture the *signal* of reopening. Therefore, in the case where a district policy is missing, we understand that to be a signal equivalent to not offering that service or support.

decline in Grades 6-8, and a 13% decline in Grades 9-12. We do not find evidence that masking policies impacted parent decision-making about whether to enroll their pre-K and kindergarten students in in-person districts. When examining results by race we find that not requiring masks led to an additional decline in White enrollment (minus 9%) and Hispanic enrollment (-26%), but the estimate of a 23% decline in Black enrollment does not reach statistical significance. Due to the small cell sizes in this estimation, we prefer the first specification in which missings are coded as no-masking. However, these alternative specification results point to a possible relationship between the lack of masking requirements and subsequent enrollment declines that warrants further examination.

**Table 9**

*Enrollment Change, by In-Person, No-Masking, and Grade Band - Alternative Specification*

| Category | Grades PK-12 | Grades PK/K | Grades 1-5 | Grades 6-8 | Grades 9-12 |
|---|---|---|---|---|---|
| *Post* | -0.055*** | -0.164*** | -0.069** | -0.035 | -0.036* |
| | (0.015) | (0.058) | (0.035) | (0.042) | (0.021) |
| *Post x In-Person* | 0.029** | 0.123** | 0.013 | 0.034* | 0.024 |
| | (0.013) | (0.055) | (0.032) | (0.020) | (0.016) |
| *Post x No-Masking* | 0.066*** | 0.069 | -0.060** | 0.037** | 0.107*** |
| | (0.011) | (0.056) | (0.029) | (0.017) | (0.015) |
| *Post x In-Person x No-Masking* | -0.100*** | -0.064 | -0.098*** | -0.073*** | -0.126*** |
| | (0.014) | (0.062) | (0.031) | (0.021) | (0.021) |

*Note*: All models control for the 7-day average normalized case rate on each district's first day of school. Missing data on masking is treated as missing. ***$p$<0.01; **$p$<0.05; *$p$<0.1.

## Conclusions and Discussion

Despite districts' best intentions amid a whirlwind of information and changing circumstances in the early stages of the pandemic, the shadow of reopening decisions continues to cast concerns on the future of student learning and experiences in school. To better inform school districts of parental and student need, we seek to understand the impact of a district's signaled choice of reopening/learning on subsequent enrollment changes independent of the impact of the pandemic. We then further our analysis in two important ways. First, we use highly-detailed data of district reopening plans to estimate the impact of other policies and provisions within a reopening method (e.g., a district's choice of in-school learning but without a masking requirement). Second, we disaggregate results by race and grade to provide evidence of the potentially disparate impacts of reopening decisions across student demographic characteristics.

In concert with previous research, we find a clear indication of relationships between a district's choice of distanced education and significant declines in enrollment, primarily within the earliest grades (Dee et al., 2023; Musaddiq et al., 2022). Specifically, signaling to start the 2020-21 school year distanced resulted in an additional 3% enrollment decline beyond the average impact of the pandemic, the consequences of which may result in noticeably lower financial resources in the coming years. The effect of switching to distanced instruction was an additional 16% decline in enrollment for pre-K and kindergarten.

Leveraging granular reopening data, we dissect the broader range of district decisions as they impact enrollment, providing evidence of two key takeaways. We find enrollment declined by 5% for middle school students attending in-person districts that did not require student masking. This suggests parents may have considered masking policies a vital safety precaution prior to the availability of vaccines (or a definite timeline to their availability), despite instances of media coverage of some parent opposition to such policies. We also observed that districts that either did not appear to incorporate community input, did not offer different instructional modes at different grade levels, or did not propose changes to instruction and mitigation strategies as community risk levels changed, experienced a 3% decrease in enrollment compared to districts that appeared to be better engaged with their communities. We find no evidence of an enrollment impact beyond the role of the pandemic for districts (distanced or in-person) that were unable to continue providing food or technological services to students, nor from other provisions.

By race and grade, we observe that White students were more likely to be withdrawn from distanced learning, a result that is in alignment with previous research. Bassok and Shapiro (2021) also found a larger decline in elementary school enrollment for White students and have attributed this to increased enrollment in private schools. Though the impact of the pandemic led to greater declines in Black student enrollment overall, particularly in middle school, we observe larger decreases among White students in districts that switched to distanced learning, suggesting greater availability of choice for White students' families or greater support among Black parents for remote learning.

Our approach to include a significant depth of district reopening decisions and policies entailed a tradeoff of district sample size and, at times, regression precision, though the districts in our sample still include two-thirds of all students statewide. We pair our preferred approach with a generalized synthetic control and find alignment with our differences-in-differences estimations. Here, we find some evidence of slight declines amongst high school students. Previous research has indicated that, for high school students nationwide, post-pandemic enrollment declines were concentrated among older students, males, and students from households without a college-educated household member (Chatterji & Li, 2021).

We must note that, while we have been able to examine the changes in enrollment both by race and by grade, this alone is not sufficient to address the challenges that families of lower socio-economic status faced during the school-pandemic era. This is particularly salient for families where working conditions may have left parents with the difficult choice of either continuing to work in person or staying home to educate their child. Homes comprised of working parents may face unique challenges in supporting their children's education. In addition to academic preparation, in-person schooling serves a critical supervisory role, rendering remote learning a particular challenge for parents working in person and for work-from-home parents struggling to simultaneously manage their own work responsibilities and their child's schooling. Socio-economic status, undoubtedly, plays an integral role in the context and exasperation of challenges families took on in lieu of reliable in-person schooling. Exploring this aspect could shed light on potential factors influencing the effectiveness of distanced learning.

While additional longitudinal data can reveal further insight into student enrollment trends, there is clear evidence that switching to distanced instruction substantially decreased enrollment in pre-K and kindergarten in Missouri. This decline of early elementary enrollment will present new challenges to districts where incoming first graders will be engaging in formal education for the first time at an older age. We also find that the pandemic resulted in large declines in enrollment for Black students, which may lead to the further widening of opportunity and achievement gaps. More work is necessary to understand the extent to which the pandemic has impacted students,

particularly those that have been historically disadvantaged, as they continue to persevere through the pandemic, oftentimes with limited resources.

In this paper, we contribute evidence of the impact of the signal of reopening plans that might better inform district leaders and policymakers to attend to the educational needs and desires of their students and communities, both for current pandemic-era recovery efforts and for long-term educational planning. Substantial enrollment declines may soon strain district financial resources and weaken capacities to respond to the pandemic's expanding opportunity and achievement gaps. However, we find critical differences within district reopening strategies that pose further concerns within districts already struggling to tend to students from afar. Beyond enrollment effects, differences among reopening plans may also lead to divergent longer-term implications for students.

Our analyses entail a tradeoff of significant granularity in school district data, particularly their reopening policies, with a somewhat limited sample size. We believe this approach remains valuable, particularly given the extant literature on pandemic enrollment decline (e.g., Dee et al., 2023; Musaddiq et al., 2022), which tends to focus on larger sample sizes at the expense of more detailed reopening data. While representative of the statewide student body of Missouri, our analytic sample is somewhat skewed to larger, metropolitan area districts and thus should be treated with appropriate caution. This itself is a result of the fact that smaller, more rural districts, more frequently opted against publishing reopening plans for public appraisal, oftentimes (and understandably) opting to connect directly with parents and families. We detail the full process of sample collection in our Appendix. Given these challenges, we find strong support that our sample aligns with previous state trends. Even more so, the value of the granularity of our data provides deeper insight into the nuance of district response than other research has yet been able to show. Nonetheless, preliminary data indicate an uneven recovery from pandemic era disenrollment across racial groups, suggesting that improved understanding of reenrollment will continue to be necessary for equitable and quality reintroduction into schools nationwide (Bacher-Hicks et al., 2023).

## Acknowledgements

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