COVID-19 AND EQUITY IN EDUCATION:
LONGITUDINAL DEEP DIVE

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Research Spotlight Series

Lessons From COVID-19: Preparing for Disruption by Examining California's Response and Implications for Students, Learning Modalities, and Access

Virtual | March 2024

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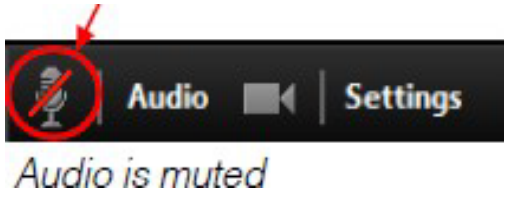
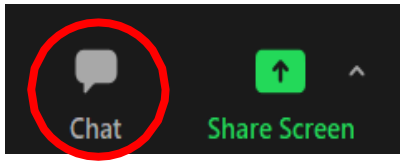
Zoom Protocol

- **Mute your mic.** This helps minimize audio feedback. Mute your audio by clicking on the microphone icon located in the lower left-hand corner of the menu bar.
- **Use chat and ask questions.** Connect with the hosts via private chat. We will insert important links in the chat for you as well.
- **Live captioning.** Turn on live captioning by clicking the CC button.



Audio is muted



AIR Inclusive Meeting Guidelines

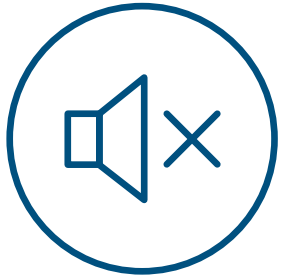
Hosting and Participating in Meetings

ENGAGE EVERYONE

BE HEARD AND SEEN

ACKNOWLEDGE SPEAKER

MAXIMIZE MICROPHONES



MINIMIZE NOISE

MAXIMIZE VISUAL DISPLAYS

These guidelines are intended to improve the meeting experience for virtual participants as well as people with hearing loss or visual impairment and those for whom English is an additional language.
Developed by the Access AIR and AIR CREW Employee Resource Groups with support from the AIR Diversity and Inclusion Office.

Agenda

1. Welcome and Overview of the COVID-19 and Equity in Education (CEE) Initiative
2. Effects of the Virtual Learning Format During the 2020–21 School Year on Spring 2022 Achievement in California
3. Digital Equity Gaps in California's K–12 Schools
4. Learning Recovery Strategies in California
5. Questions and Answers
6. Closing and Survey

COVID-19 and Equity in Education (CEE) Initiative

Our hope for the future is to …

- advance equity;
- elevate the voices, perspectives, and experiences of individuals and communities most severely impacted by the pandemic;
- prioritize the concerns articulated by participating communities; and
- focus on increasing understanding to inform equity-focused action.

CEE Community of Researchers

The goal for the **CEE Community of Researchers** is to establish a collaborative network of emerging and established researchers dedicated to advancing equity in education through focused research and engagement on the pandemic and pandemic recovery experiences of Black and Latinx students and students experiencing poverty.

CEE Resources and Events

CEE Pandemic Literature Library	Webinar Series	Virtual Annual Convening
CEE Longitudinal Database	Featured Member Blogs	Online SharePoint Platform

CEE Mini-Research Grants

- Funds research proposals between $5,000 and $25,000 to conduct new research or to expand and enhance existing research focusing on COVID-19 pandemic recovery and equity in the K–12 education system.
- 2021–22 awards announced.

By the Numbers

60+	40+	4
Researchers	**Organizations**	**Mini-Research Grant Awardee Teams**

Lessons From COVID-19: Preparing for Disruption by Examining California's Response and Implications for Students, Learning Modalities, and Access

Dr. Deborah Holtzman

Dr. Niu Gao

Dr. Jonathan Isler

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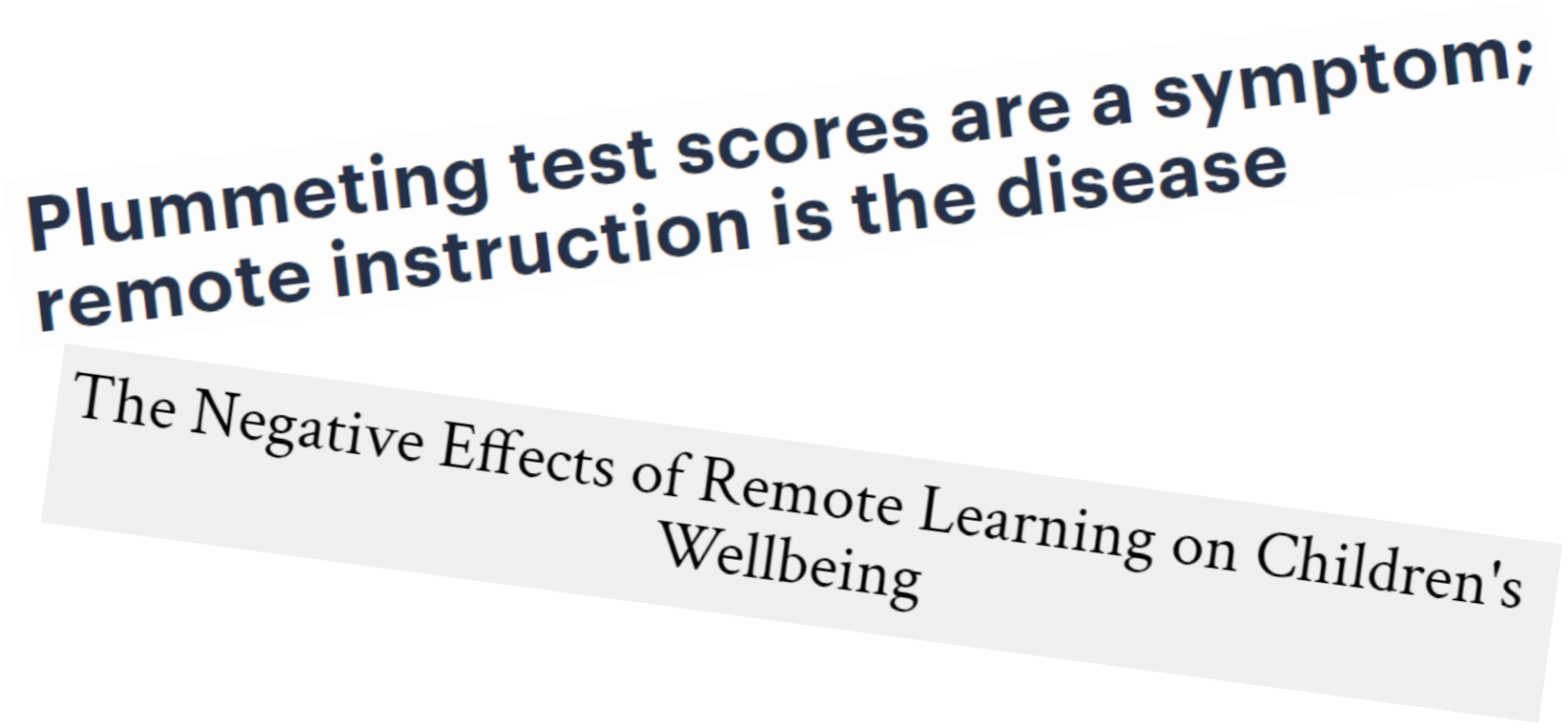
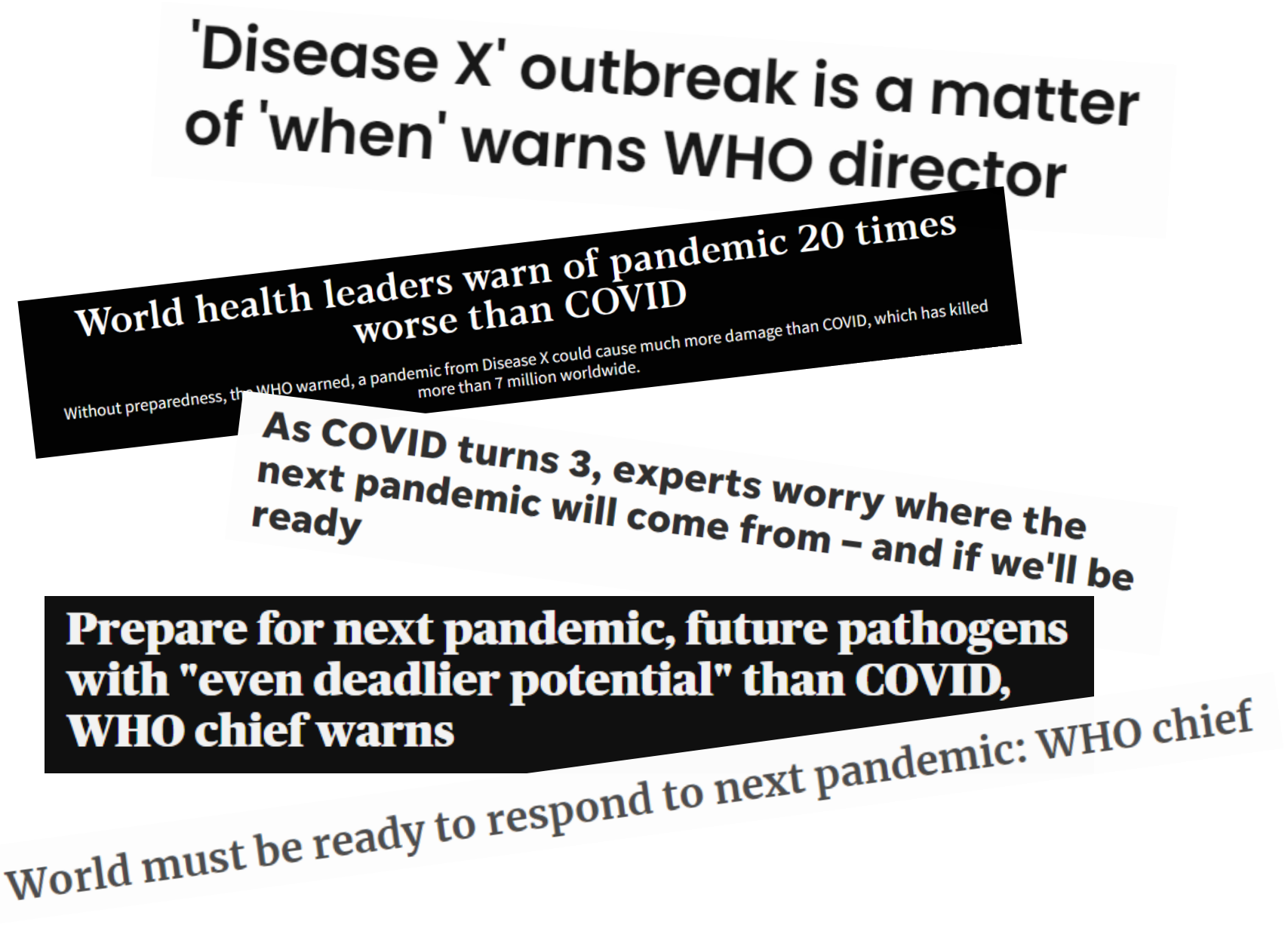
Effects of the Virtual Learning Format During the 2020–21 School Year on Spring 2022 Achievement in California

An Analysis Using Data from AIR's COVID-19 and Equity in Education (CEE) Longitudinal Database

Deborah J. Holtzman, Principal Researcher, AIR



"By 2022, journalists, academics, and even some public-health officials were finally coming to grips with the enormous damage done to children—especially disadvantaged children—*because of remote learning*" (Nocera & McLean, 2023, emphasis added).

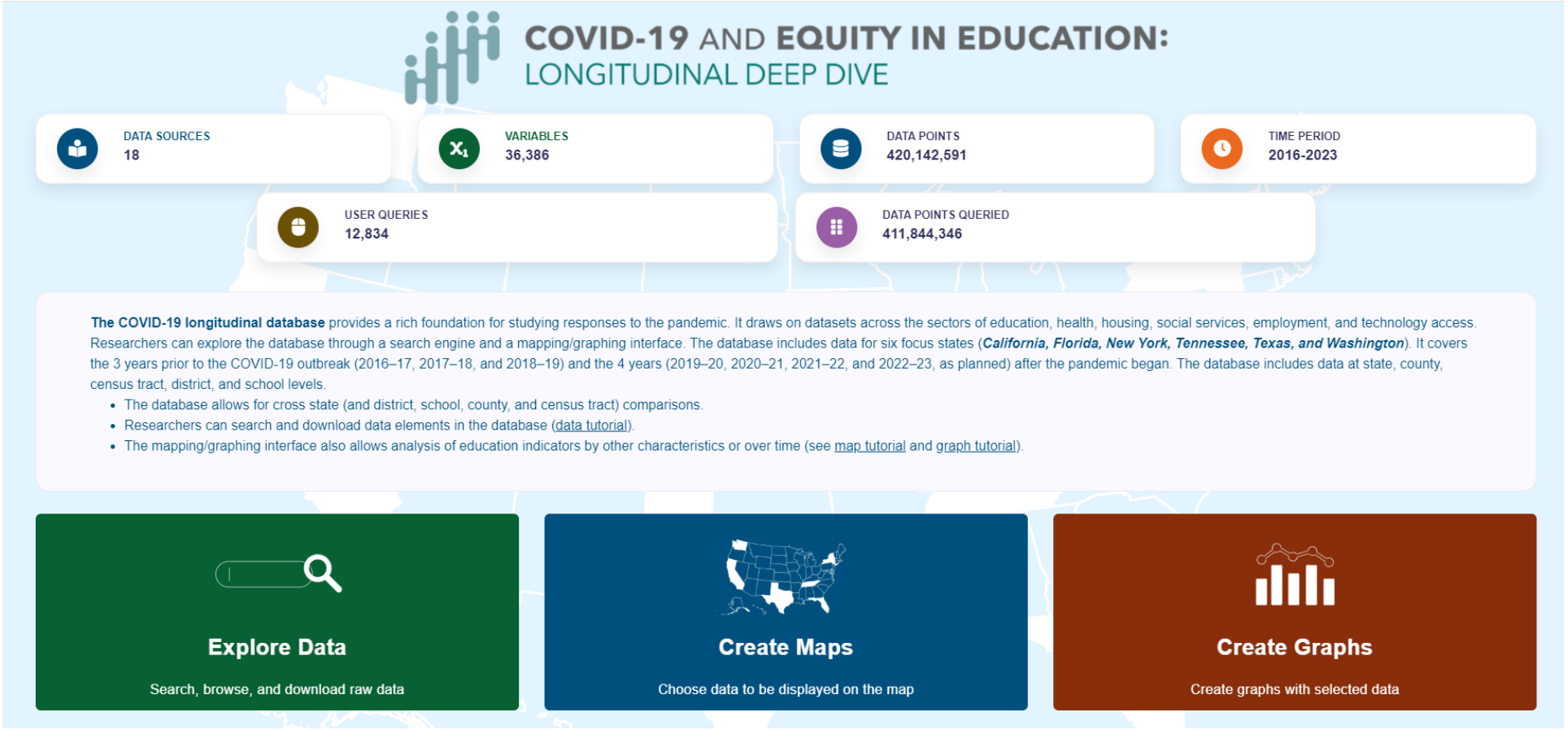

'Disease X' outbreak is a matter of 'when' warns WHO director
World health leaders warn of pandemic 20 times worse than COVID
Without preparedness, the WHO warned, a pandemic from Disease X could cause much more damage than COVID, which has killed more than 7 million worldwide.
As COVID turns 3, experts worry where the next pandemic will come from – and if we'll be ready
Prepare for next pandemic, future pathogens with "even deadlier potential" than COVID, WHO chief warns
World must be ready to respond to next pandemic: WHO chief

Research Question

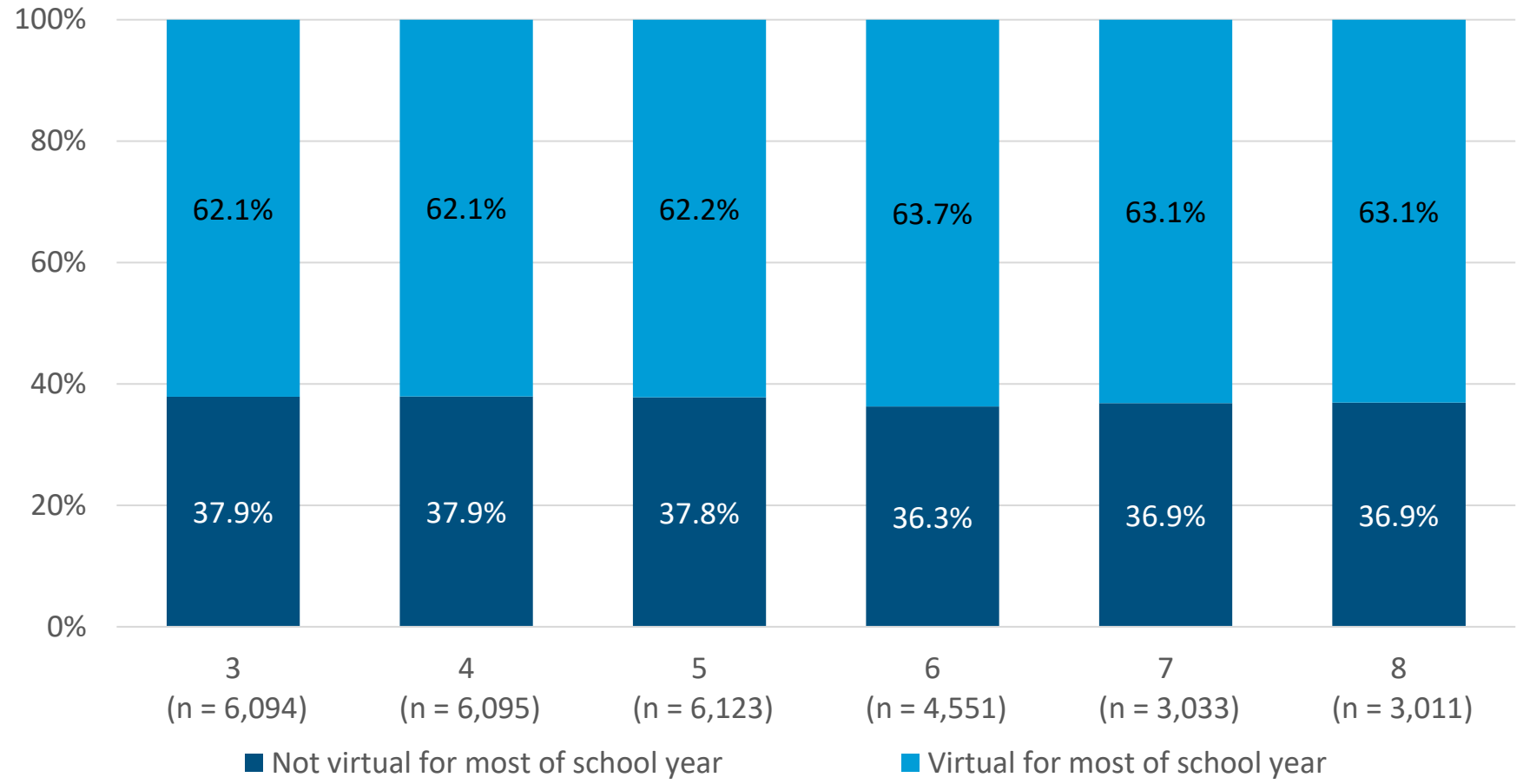
How was school learning mode—virtual or not—during the 2020–21 school year related to spring 2022 English language arts (ELA) and mathematics achievement in California public schools, and did these relationships differ

1) by grade level (for Grades 3–8)?
2) between economically disadvantaged and not economically disadvantaged students?

Data Source


COVID-19 AND EQUITY IN EDUCATION:
LONGITUDINAL DEEP DIVE
DATA SOURCES
18
VARIABLES
36,386
DATA POINTS
420,142,591
TIME PERIOD
2016-2023
USER QUERIES
12,834
DATA POINTS QUERIED
411,844,346
The COVID-19 longitudinal database provides a rich foundation for studying responses to the pandemic. It draws on datasets across the sectors of education, health, housing, social services, employment, and technology access. Researchers can explore the database through a search engine and a mapping/graphing interface. The database includes data for six focus states (California, Florida, New York, Tennessee, Texas, and Washington). It covers the 3 years prior to the COVID-19 outbreak (2016–17, 2017–18, and 2018–19) and the 4 years (2019–20, 2020–21, 2021–22, and 2022–23, as planned) after the pandemic began. The database includes data at state, county, census tract, district, and school levels.
The database allows for cross state (and district, school, county, and census tract) comparisons.
Researchers can search and download data elements in the database (data tutorial).
The mapping/graphing interface also allows analysis of education indicators by other characteristics or over time (see map tutorial and graph tutorial).
Explore Data
Search, browse, and download raw data
Create Maps
Choose data to be displayed on the map
Create Graphs
Create graphs with selected data

Overall Distribution of Virtual Versus Not Virtual



We defined "virtual" as operating virtually for more than 70% of the 2020-to-21 school year.

Among schools with any of grades 3 through 8, a little less than two-thirds of them were virtual for most of the school year.

Note. Total *N* of schools = 7,782. "Virtual" is defined as operating virtually for more than 70% of the 2020-to-21 school year, i.e., more than 7 of 10 months. "Not virtual" includes both in-person and hybrid. Learning mode data originate from the COVID-19 School Data Hub (https://www.covidschooldatahub.com/).

Our Analysis

- We examined the relationship between virtual status during the 2020–21 school year and achievement in spring 2022 in California schools.
- ELA and math achievement were measured by the California Assessment of Student Performance and Progress (CAASPP; California state testing program) in Grades 3–8.
- Unit of analysis was grade level within schools:
  - Publicly available aggregate data (i.e., grade-level means) compiled in the CEE database
  - Separate analyses for economically disadvantaged and not economically disadvantaged subgroups

Number of Analyses

We conducted eight separate analyses:

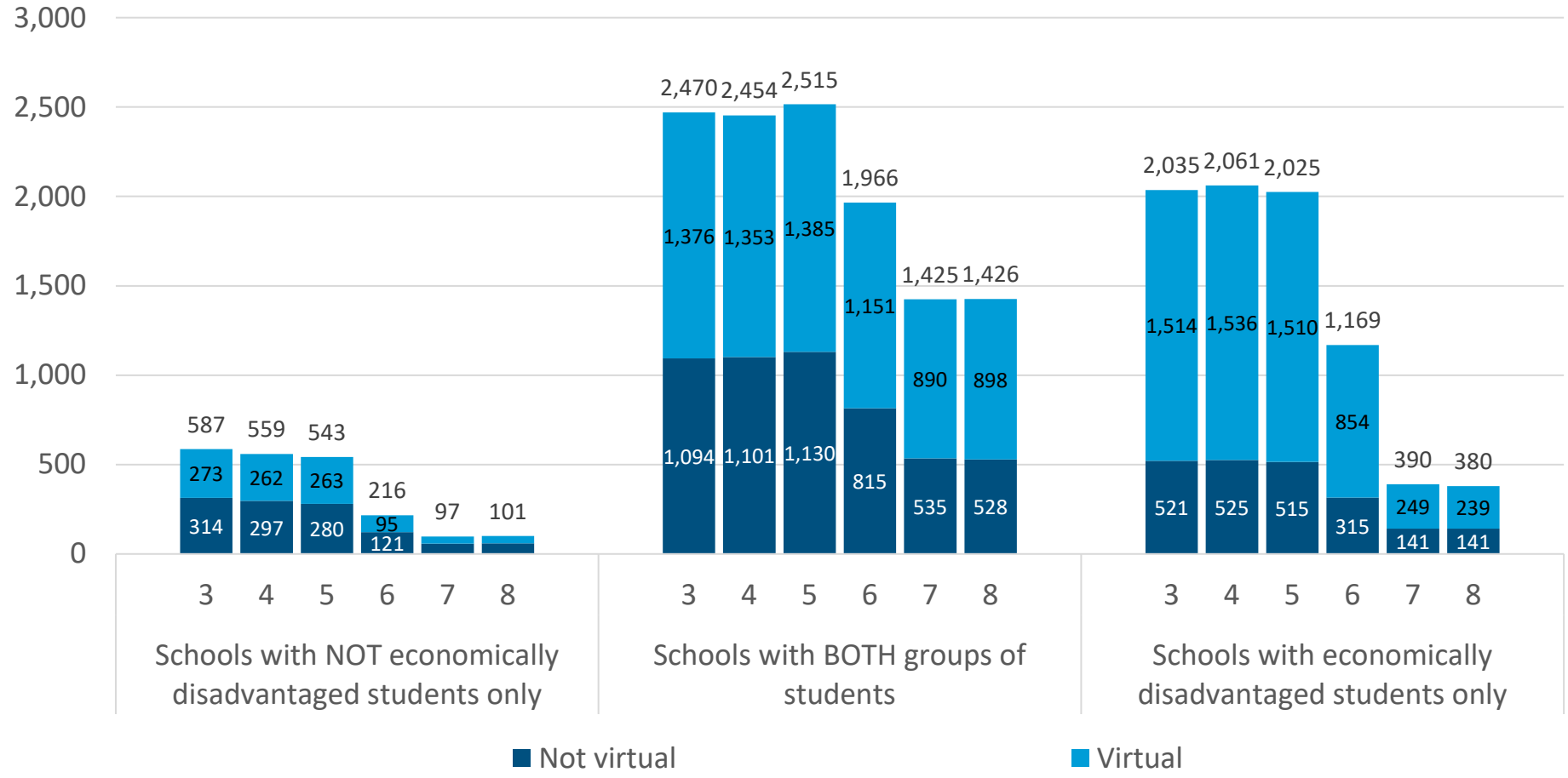
- 2 subject areas × 2 economic subgroups = 4
- Times another 2:
  - One set of analyses for **all** schools* that had students of the economic subgroup being analyzed
  - Another set of analyses for a **subset** of schools: those that had students in *both* economic subgroups (within grade level)

*Excluding about 1300 schools that had missing data. These were mostly schools with small Ns, for which the achievement data were suppressed.

Descriptives on Virtual Versus Nonvirtual by Economic Subgroup

For the ELA Analysis Samples (the Math Analysis Samples Are Nearly Identical)

Number of Schools That Were Nonvirtual and Virtual (ELA Analysis Samples)

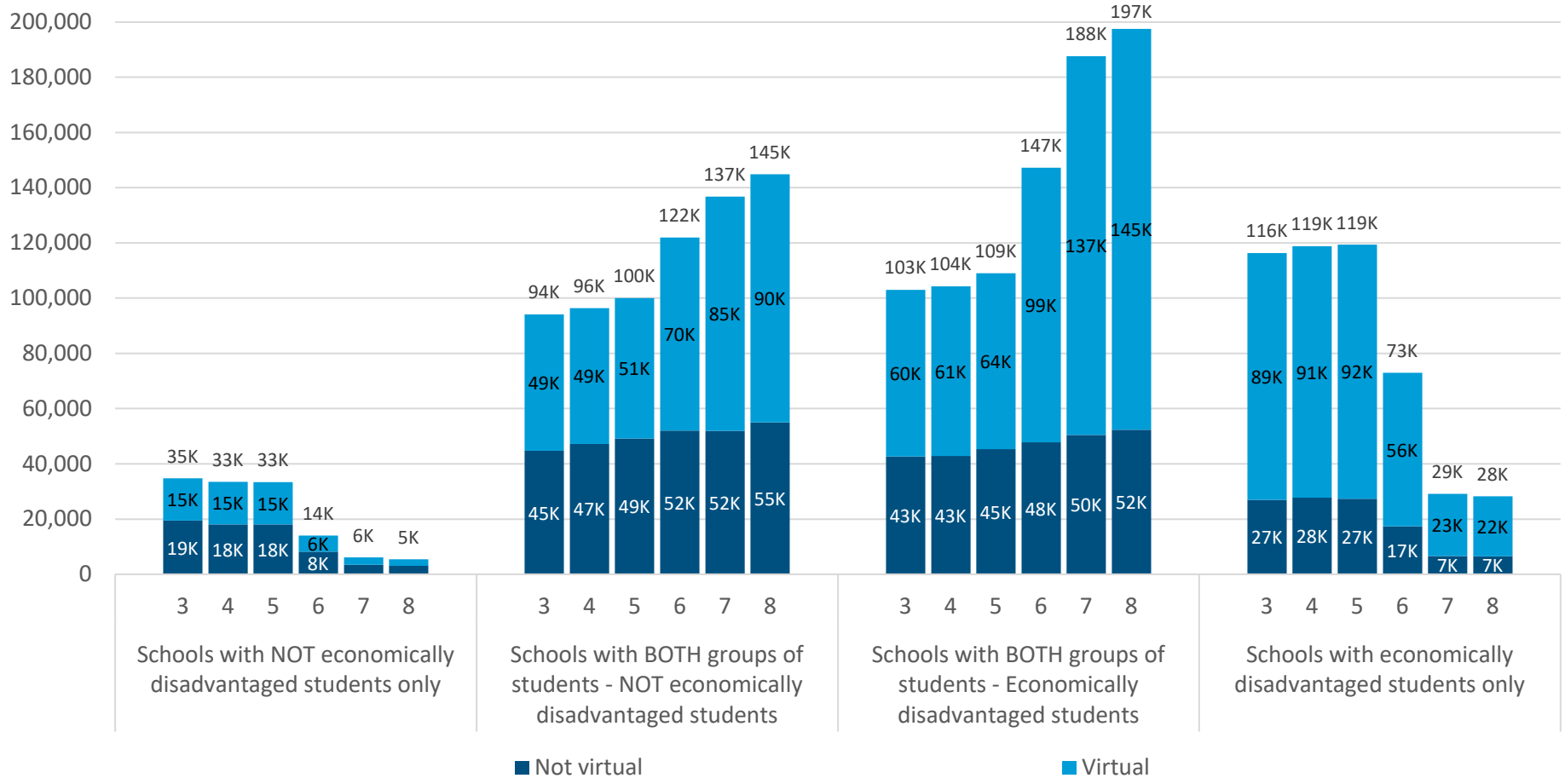


Schools that served exclusively economically disadvantaged students (the bars on the right) were more likely to be virtual than the other two groups of schools.

- In grades 3-5, about 75% in the righthand bars were virtual compared to about 55% in the middle bars and slightly under half in the left bars.
- For grades 7 and 8, about 63% were virtual in both the righthand and middle sets, compared to almost too few too count in the lefthand set.

Note. Total number of schools is 6,514. Number of schools is 827 for the first set of bars, 4,221 for the second set, and 2,672 for the third set. Schools in the three sets of bars are mutually exclusive for each of the individual grade levels but not for the bar sets as a whole because of differences among the grade levels. For instance, a school may be in the first set of bars at Grade 3 and in the second set at Grade 4.

Number of *Students* Represented (ELA Analysis Samples)



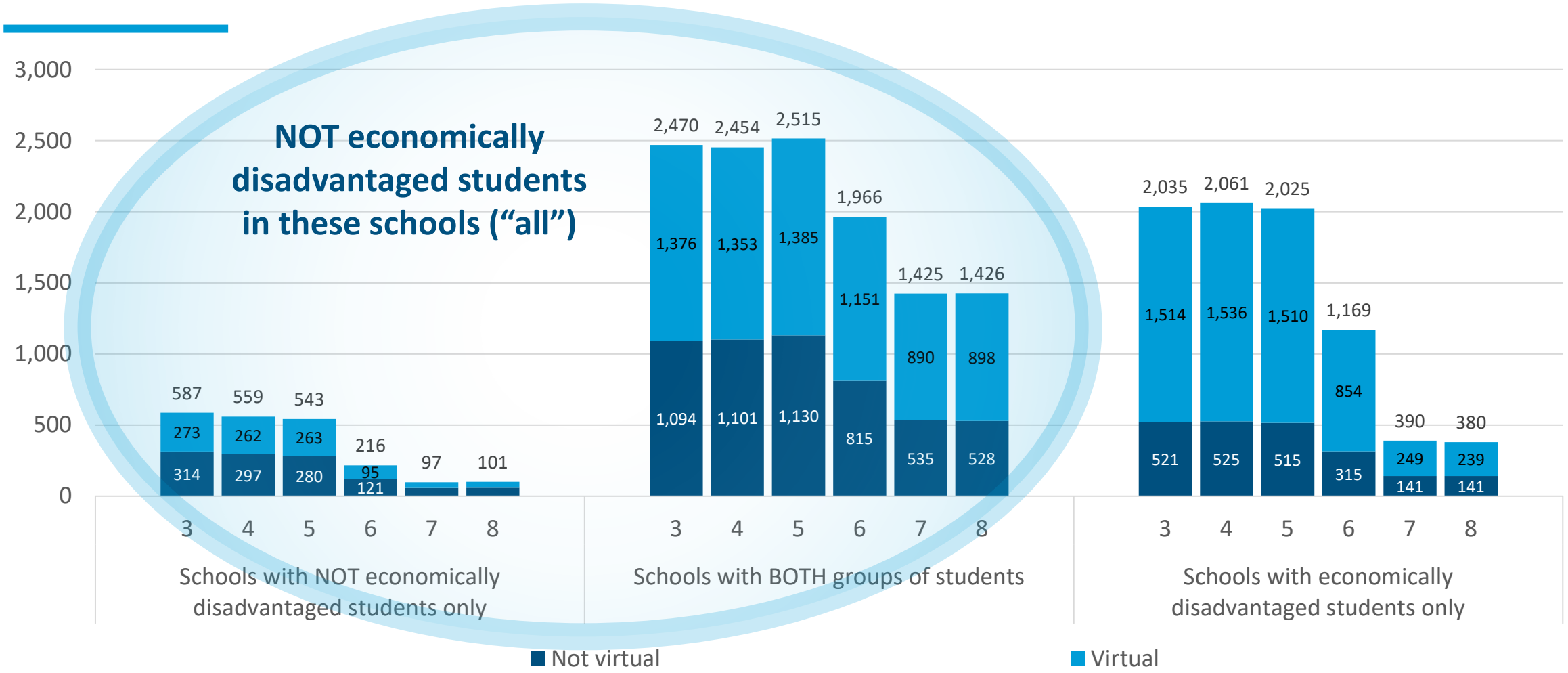
By grades 7 and 8, most students are in schools that serve both economically disadvantaged students and not economically disadvantaged students (middle two sets of bars).

Note. Reported number of students tested in ELA in 2021-22.

Recapping the Different Analysis Samples

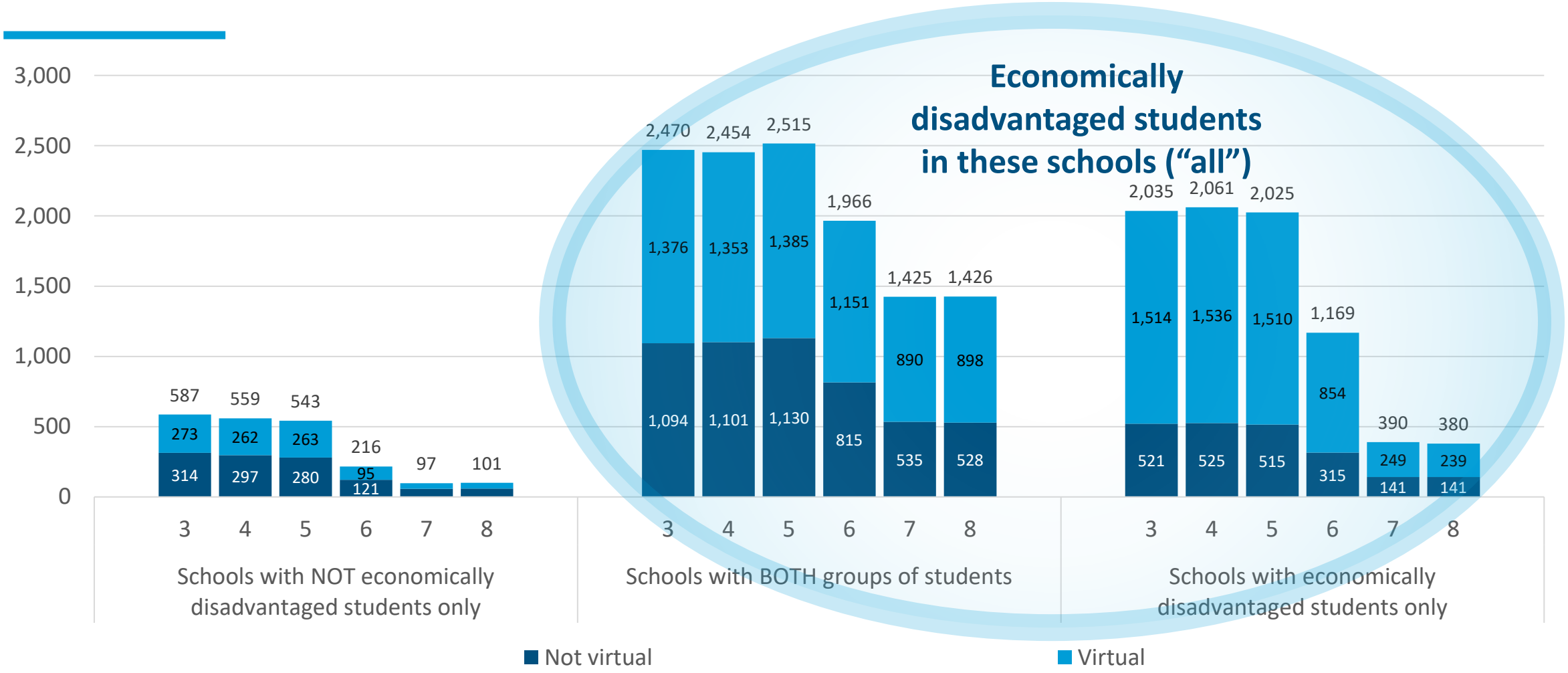
For the ELA Analyses (Parallel for Math Analyses)

ELA Analysis Sample #1: All Schools, Not Economically Disadvantaged



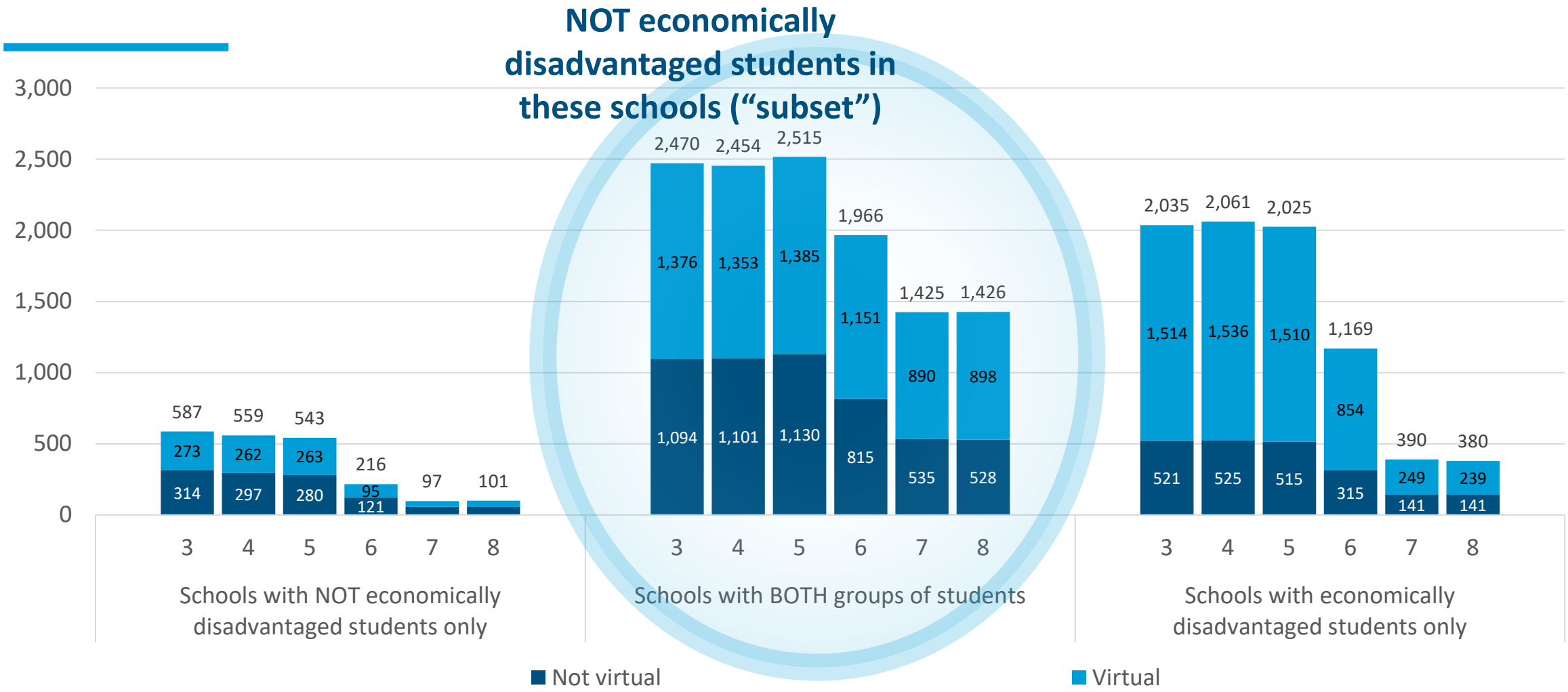
Note. Total number of schools is 6,514. Number of schools is 827 for the first set of bars, 4,221 for the second set, and 2,672 for the third set. Schools in the three sets of bars are mutually exclusive for each of the individual grade levels but not for the bar sets as a whole because of differences among the grade levels. For instance, a school may be in the first set of bars at Grade 3 and in the second set at Grade 4.

ELA Analysis Sample #2: All Schools, Economically Disadvantaged



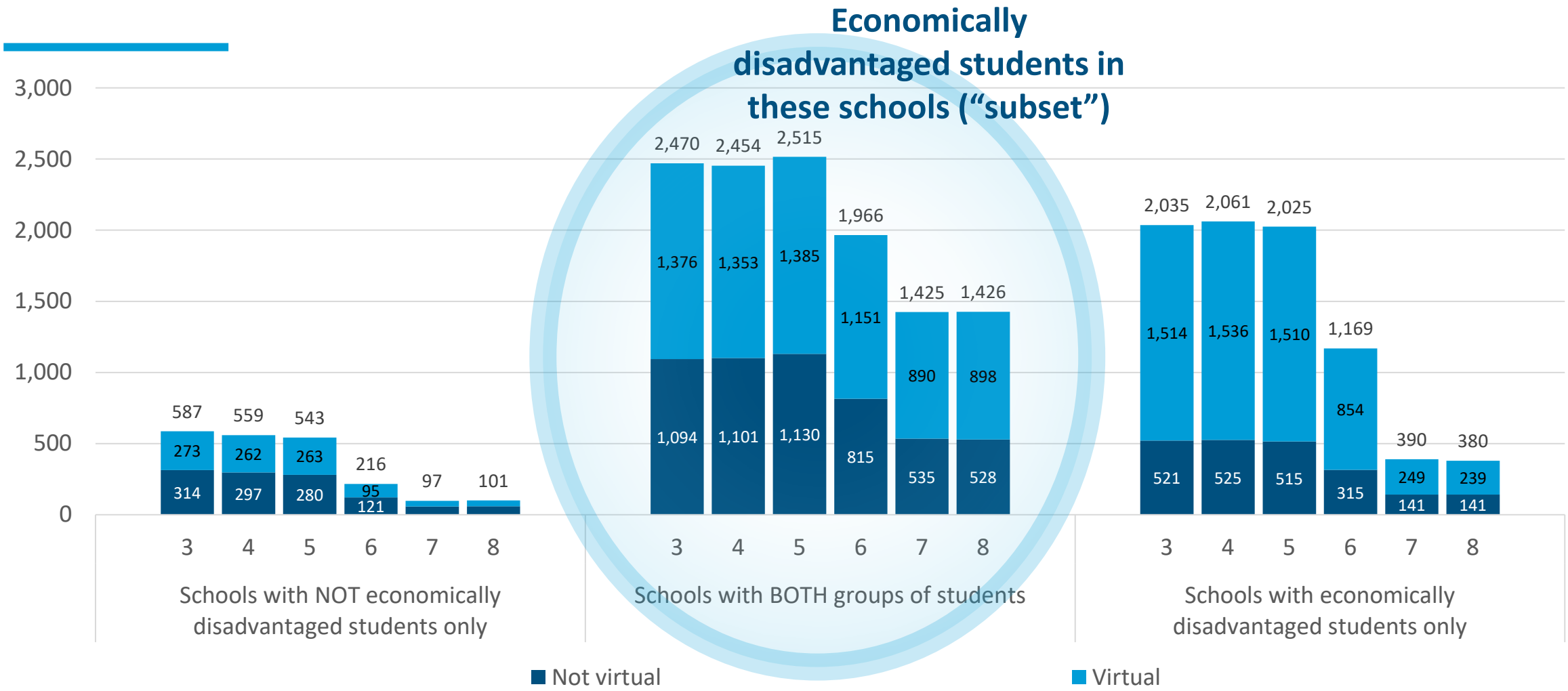
Note. Total number of schools is 6,514. Number of schools is 827 for the first set of bars, 4,221 for the second set, and 2,672 for the third set. Schools in the three sets of bars are mutually exclusive for each of the individual grade levels but not for the bar sets as a whole because of differences among the grade levels. For instance, a school may be in the first set of bars at Grade 3 and in the second set at Grade 4.

ELA Analysis Sample #3: Subset of Schools, Not Economically Disadvantaged



Note. Total number of schools is 6,514. Number of schools is 827 for the first set of bars, 4,221 for the second set, and 2,672 for the third set. Schools in the three sets of bars are mutually exclusive for each of the individual grade levels but not for the bar sets as a whole because of differences among the grade levels. For instance, a school may be in the first set of bars at Grade 3 and in the second set at Grade 4.

ELA Analysis Sample #4: Subset of Schools, Economically Disadvantaged



Note. Total number of schools is 6,514. Number of schools is 827 for the first set of bars, 4,221 for the second set, and 2,672 for the third set. Schools in the three sets of bars are mutually exclusive for each of the individual grade levels but not for the bar sets as a whole because of differences among the grade levels. For instance, a school may be in the first set of bars at Grade 3 and in the second set at Grade 4.

Statistical Analysis of the Relationship Between Learning Format and Achievement

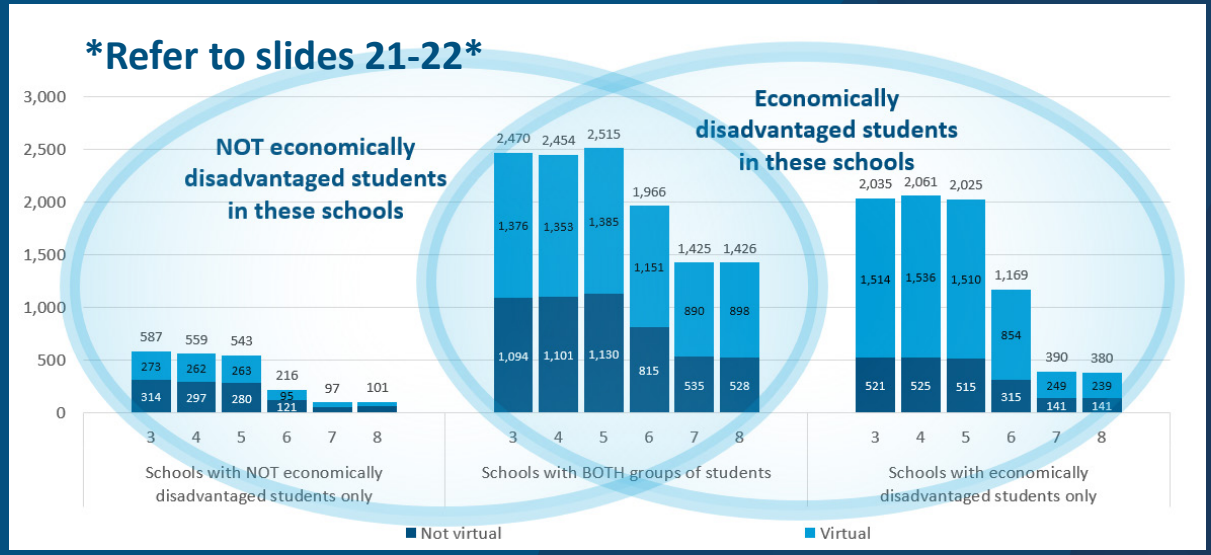
Estimation Strategy

- Unit of analysis: grade level within school
- Outcome: the subgroup's mean achievement (for the subject area) in spring 2022
- Predictors:
  - School virtual status during 2020–21 interacted with grade level to yield a separate effect estimate for each grade level
  - Indicators for grade level
  - The subgroup's mean achievement (for the subject area) in spring 2019
  - School level (elementary, middle, or other)
  - Interactions between grade level and spring 2019 achievement

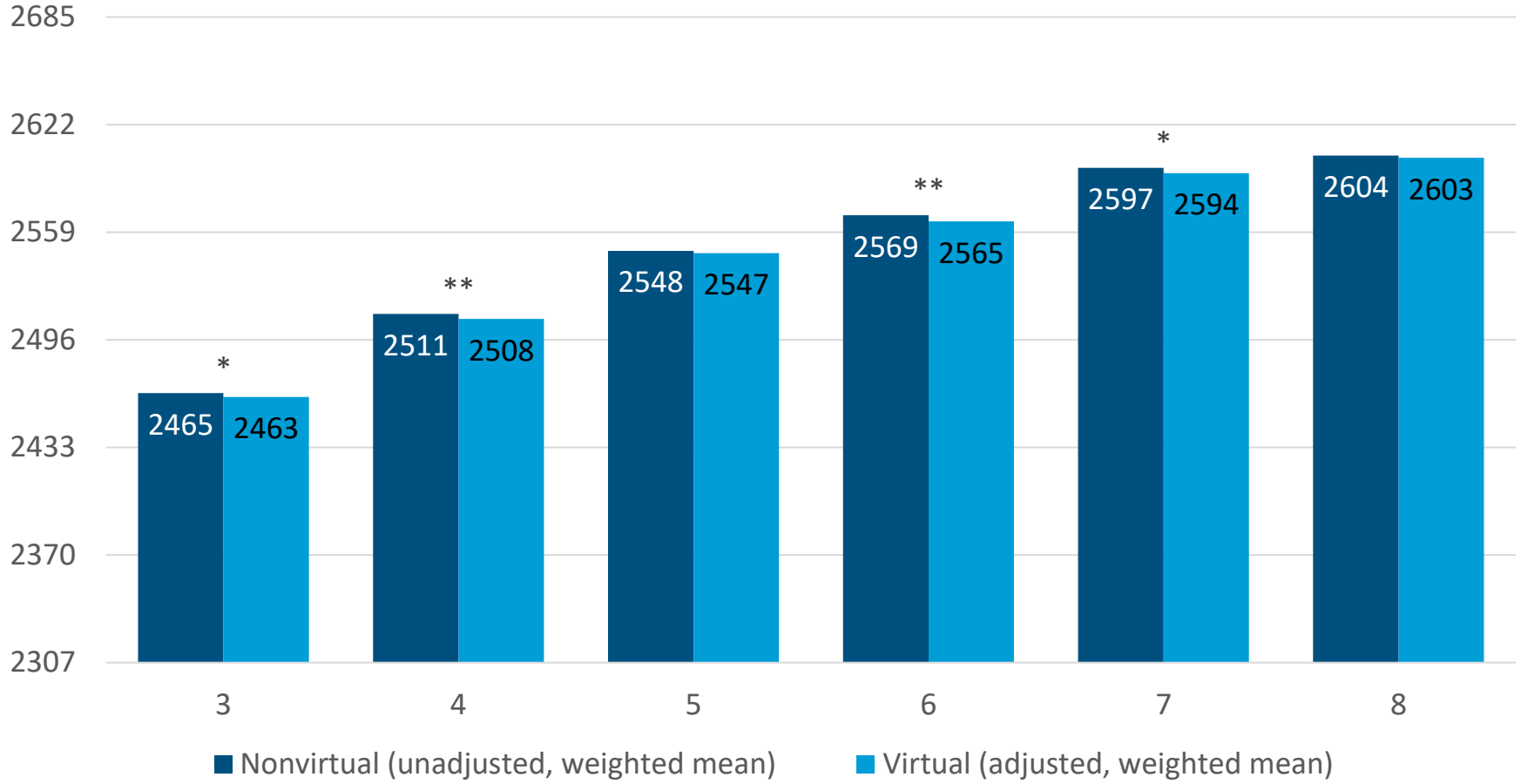
Estimation Strategy—continued

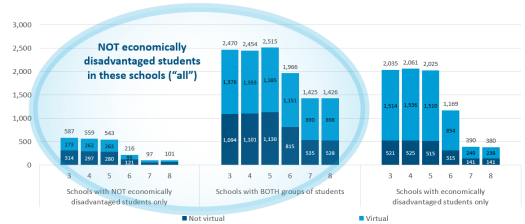
- Three-level multilevel model: measure within grade level within school
- Weighted all variables by the inverse of the standard deviation of the measurement error
- Postestimation z-tests compared the estimates of the two economic subgroups (for each grade level)

Findings for the "All" Sample



ELA: Mean Scale Scores for *Not* Economically Disadvantaged Subgroup (All), Nonvirtual and Virtual



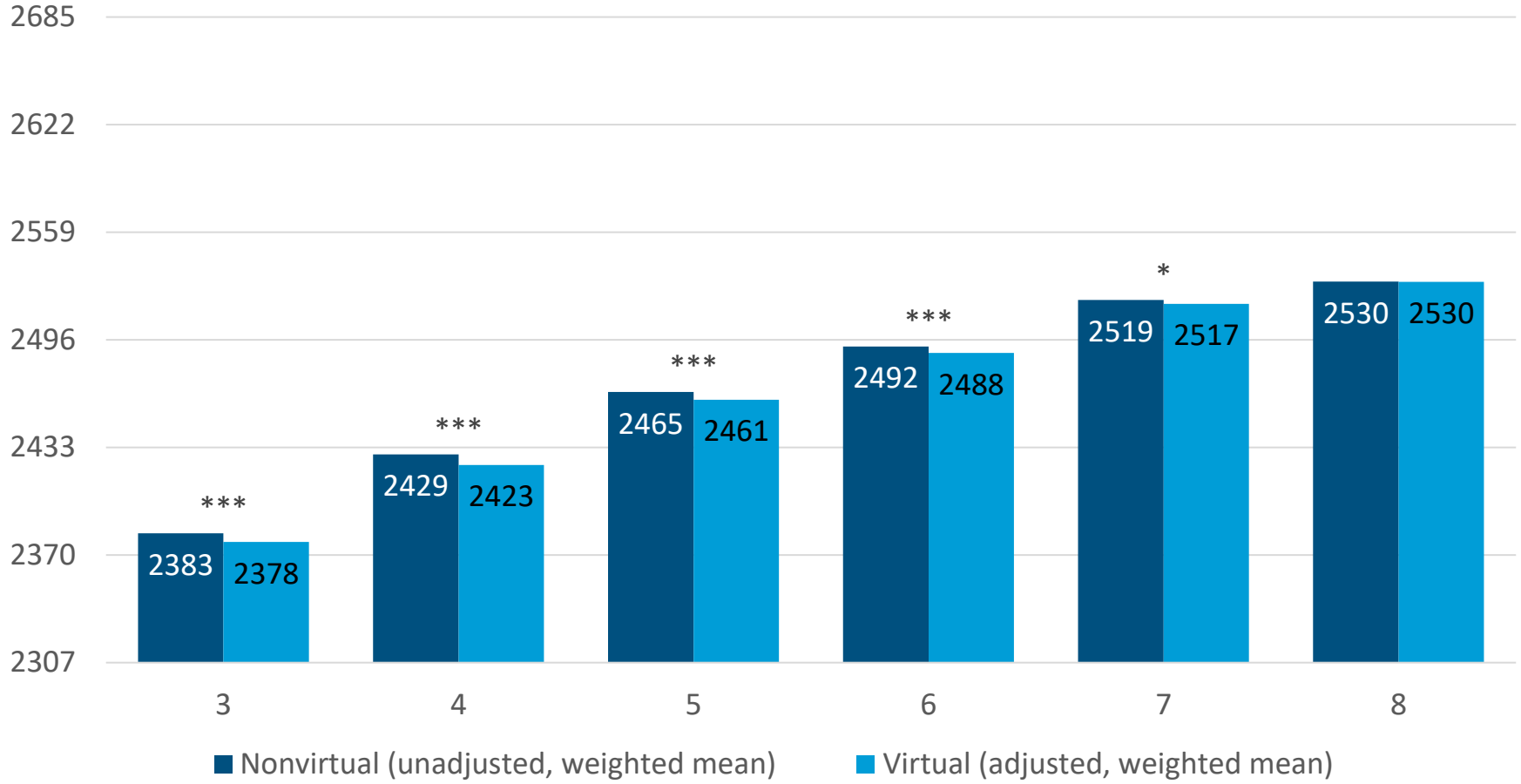


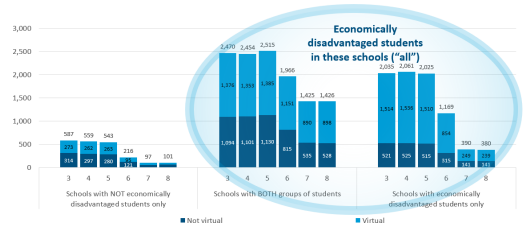
For NOT economically disadvantaged students, being virtual in 2020-21 was associated with statistically significantly lower ELA scores in spring 2022 in grades 3, 4, 6, and 7.

Note. 14,359 observations (representing 821,365 students) in 4,697 schools. *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.10$

Link to Subset

ELA: Mean Scale Scores for Economically Disadvantaged Subgroup (All), Nonvirtual and Virtual



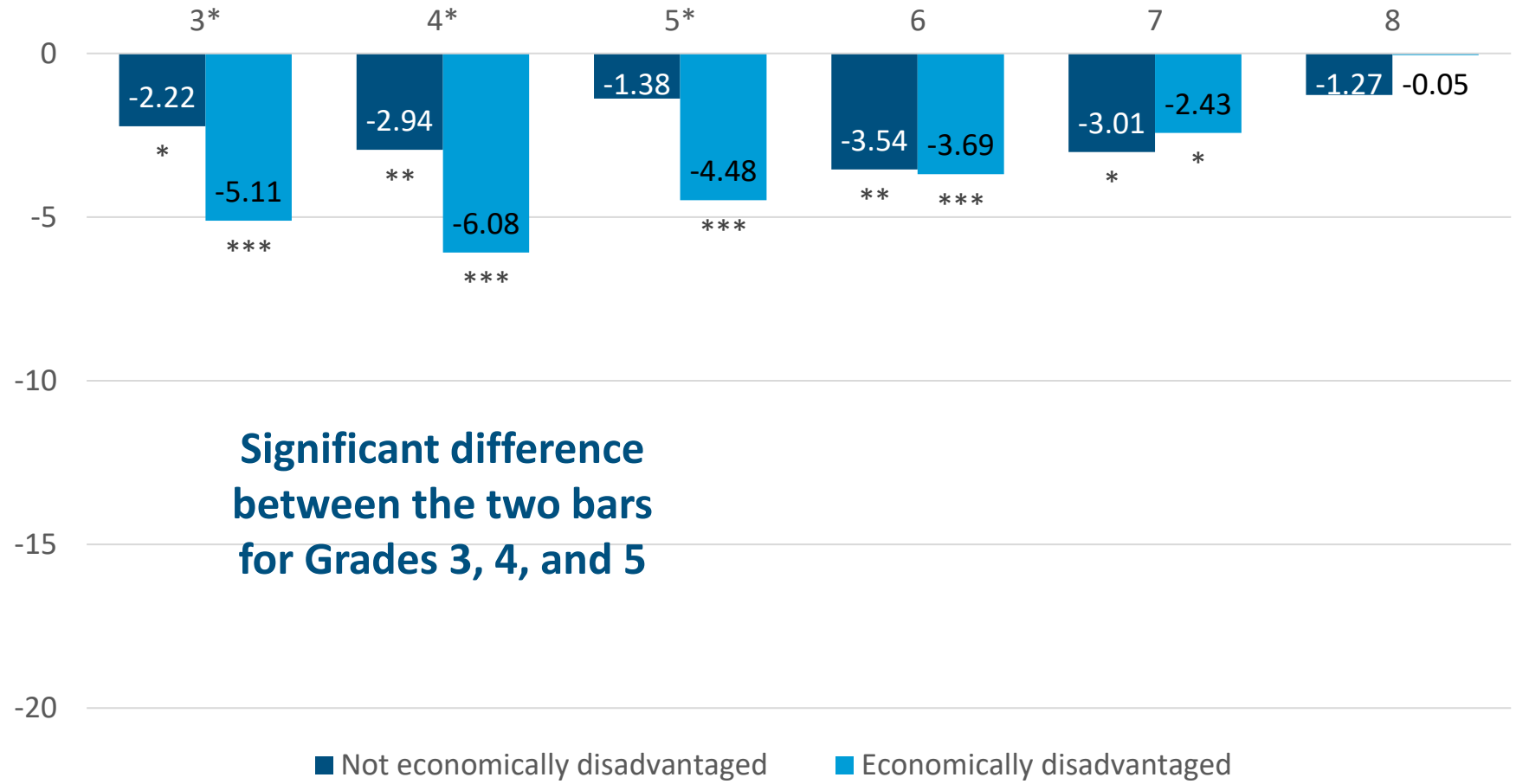


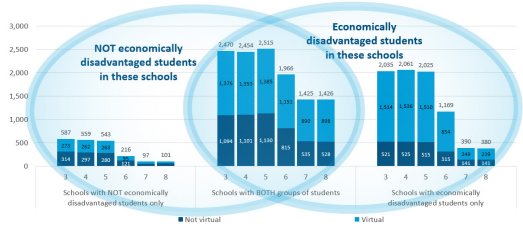
For economically disadvantaged students, being virtual in 2020-21 was associated with statistically significantly lower ELA scores in spring 2022 in all grades except 8th.

Note. 20,316 observations (representing 1,333,505 students) in 6,048 schools. *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.10$

Link to Subset

ELA: Estimated Effect of Being Virtual for Both Groups (All)



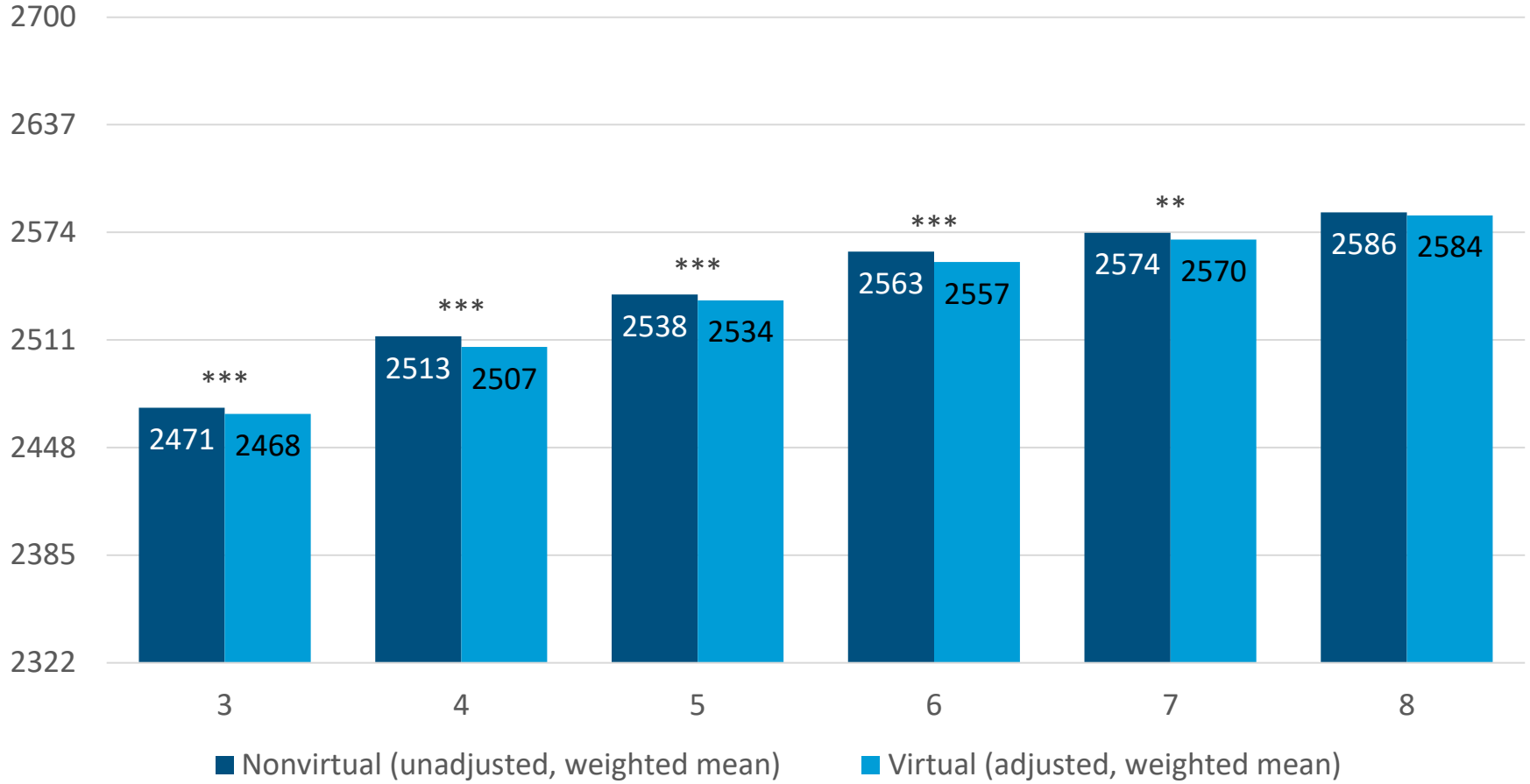


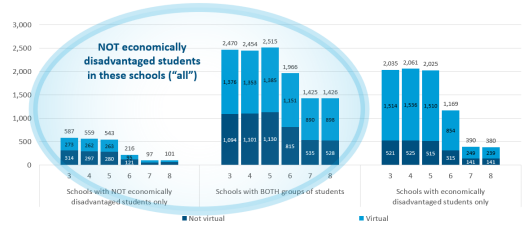
For grades 3, 4, and 5, the virtual effect is statistically significantly larger for the economically disadvantaged subgroup than for the not disadvantaged subgroup.

Note. See previous slides for *N*s. *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.10$

Link to Subset

Math: Mean Scale Scores for *Not* Economically Disadvantaged Subgroup (All), Nonvirtual and Virtual



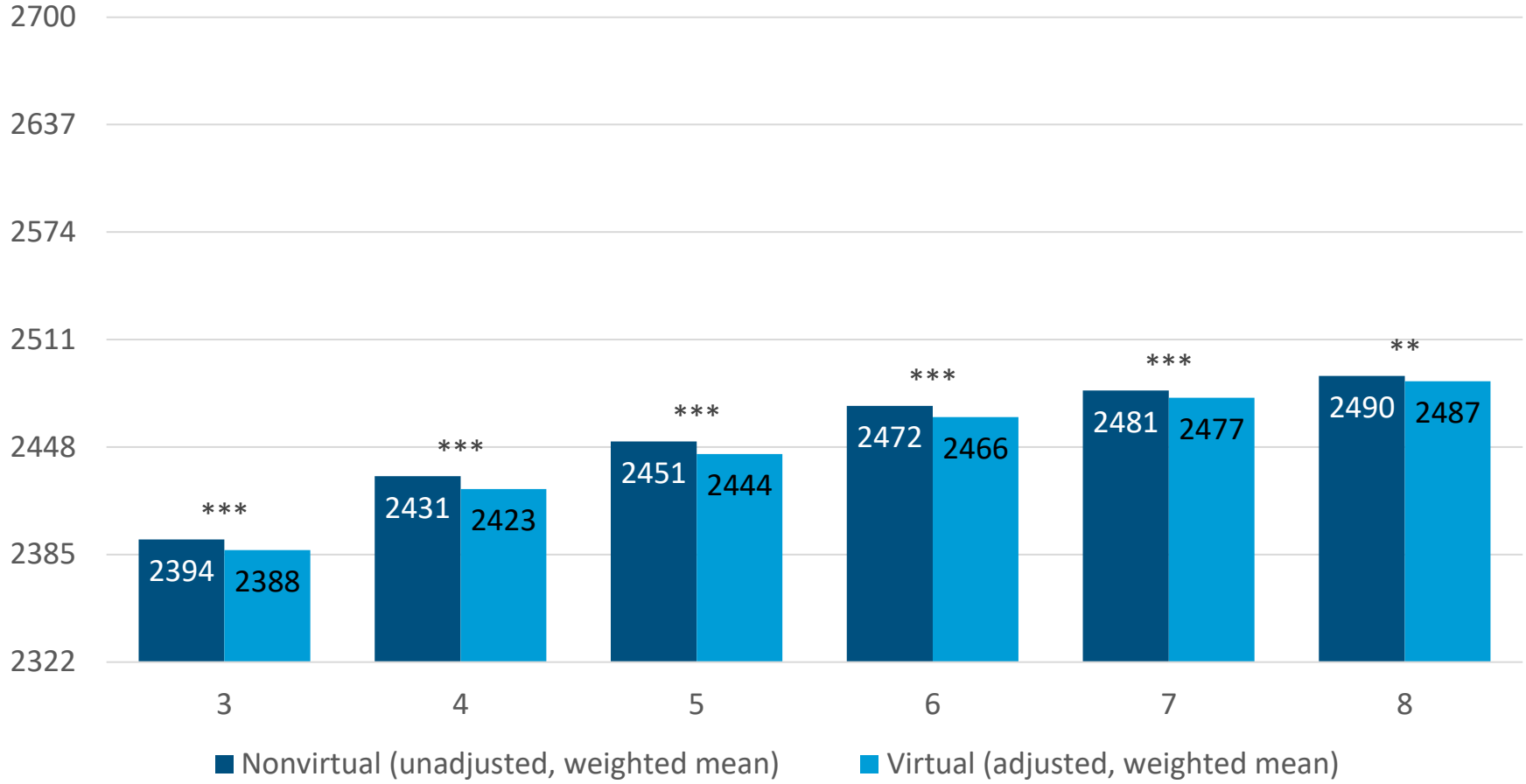


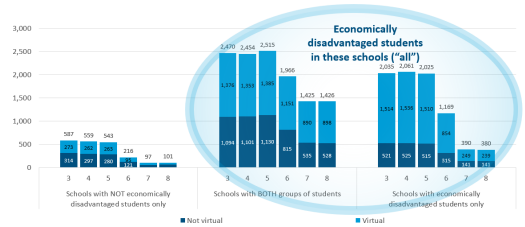
For NOT economically disadvantaged students, being virtual in 2020-21 was associated with statistically significantly lower math scores in spring 2022 in all grades except 8th.

Note. 14,438 observations (representing 825,076 students) in 4,722 schools. *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.10$

Link to Subset

Math: Mean Scale Scores for Economically Disadvantaged Subgroup (All), Nonvirtual and Virtual



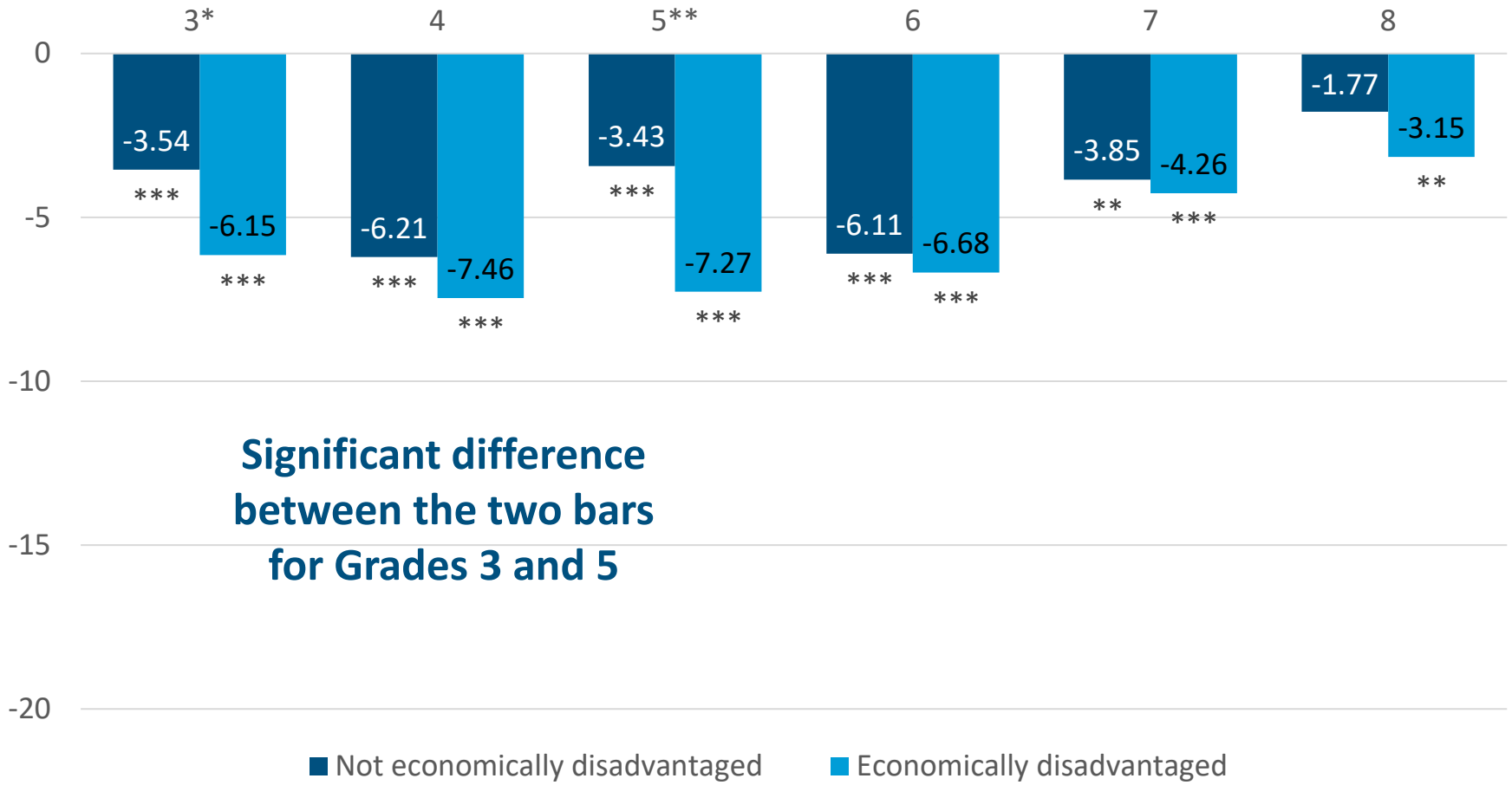


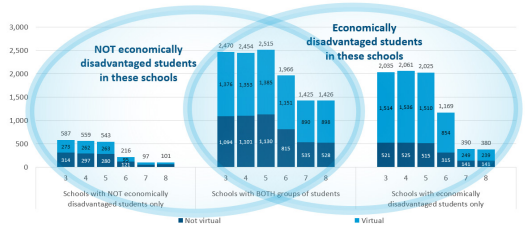
For economically disadvantaged students, being virtual in 2020-21 was associated with statistically significantly lower math scores in spring 2022 in all grades, including 8th.

Note. 20,319 observations (representing 1,335,917 students) in 6,047 schools. *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.10$

Link to Subset

Math: Estimated Effect of Being Virtual for Both Groups (All)



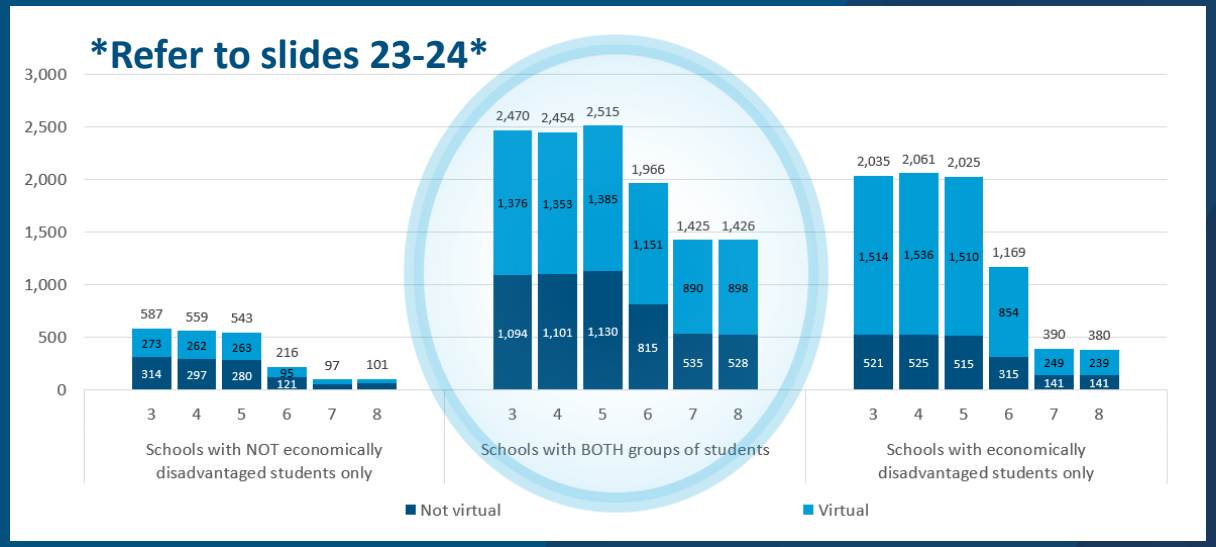


For grades 3 and 5, the virtual effect is statistically significantly larger for the economically disadvantaged subgroup than for the not disadvantaged subgroup.

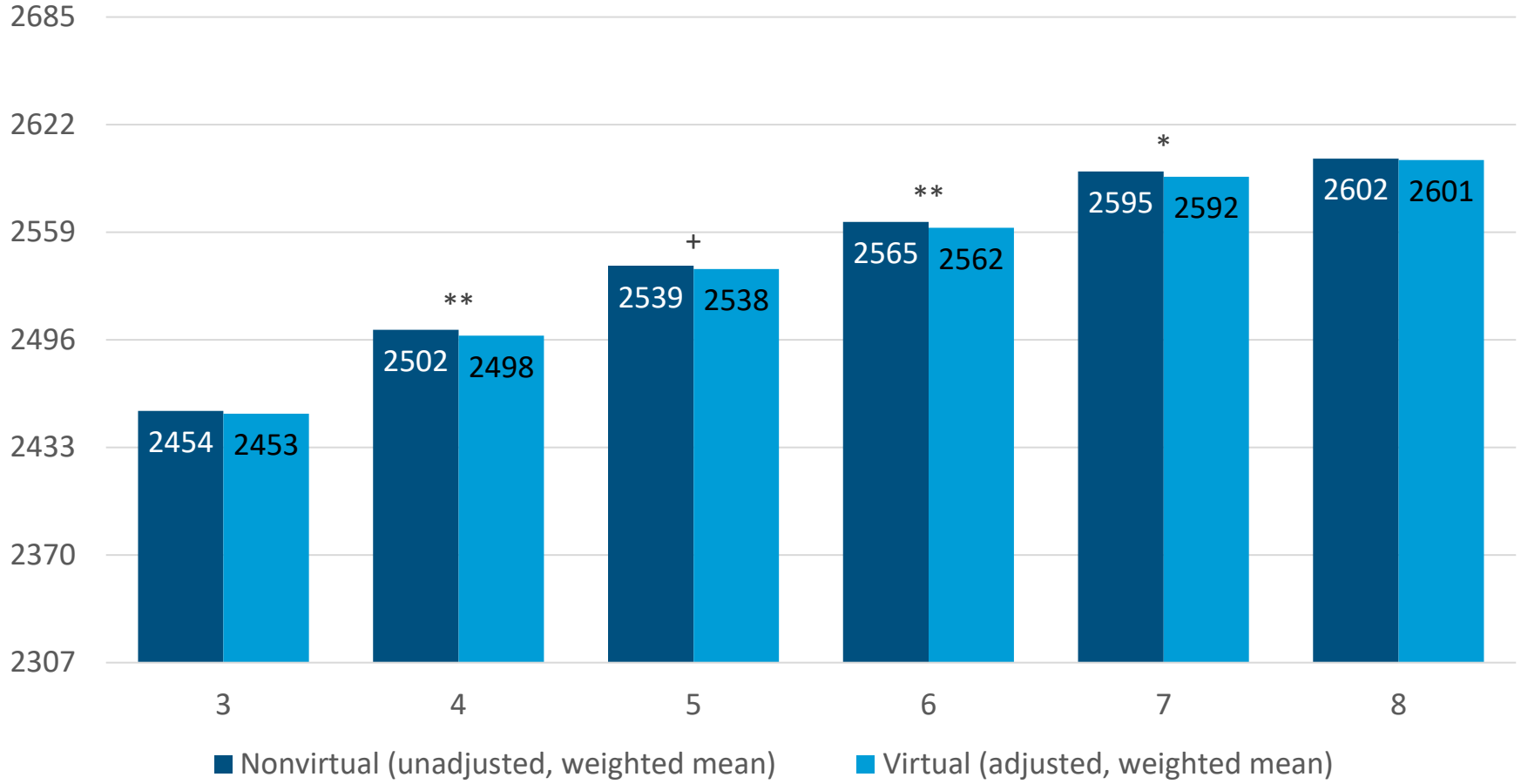
Note. See previous slides for *N*s. *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.10$

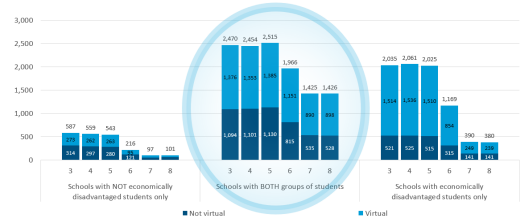
Link to Subset

Findings for the “Subset” Sample



ELA: Mean Scale Scores for *Not* Economically Disadvantaged Subgroup (Subset), Nonvirtual and Virtual



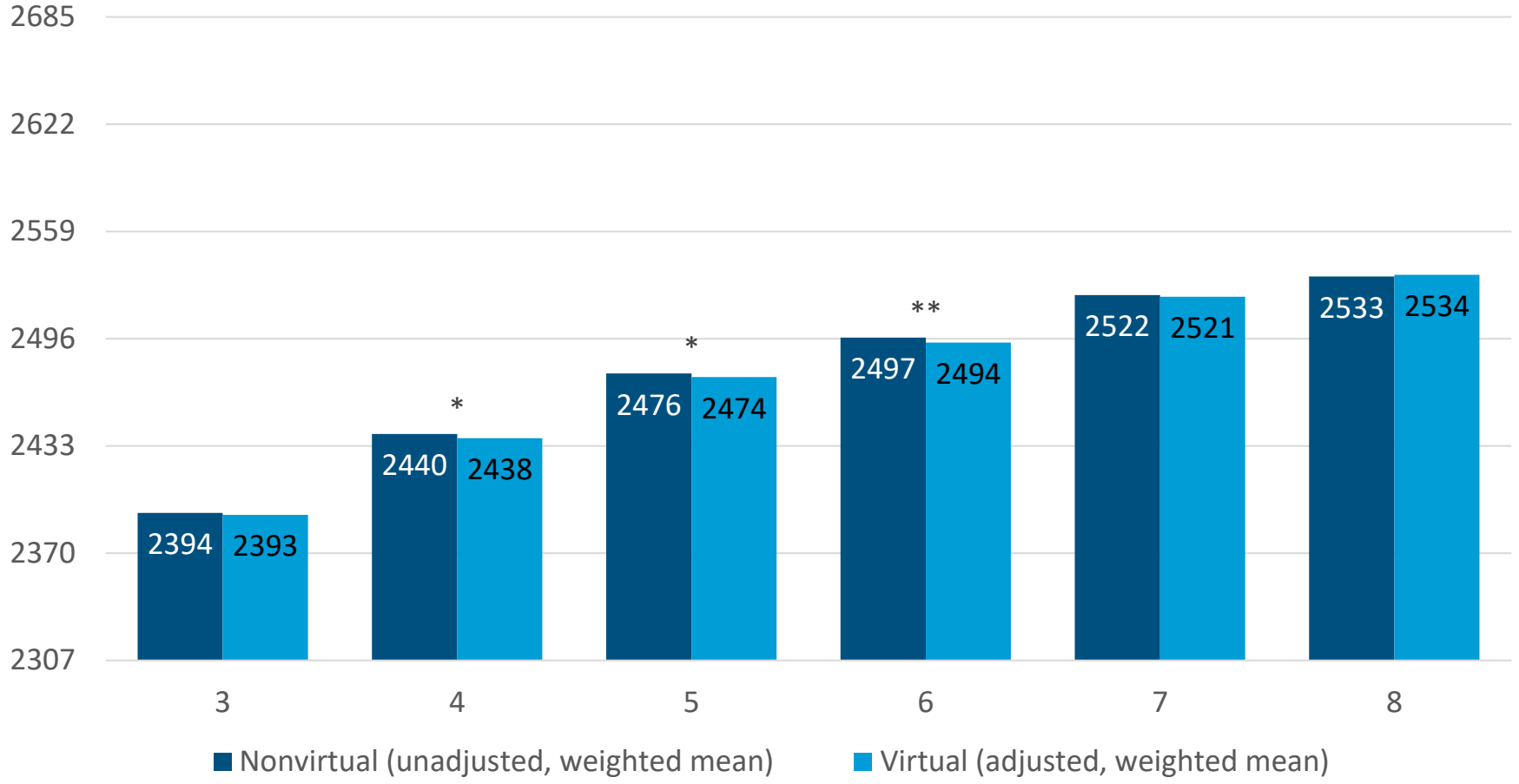


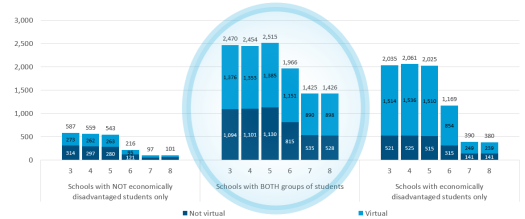
In the subset schools: For NOT economically disadvantaged students, being virtual in 2020-21 was associated with lower ELA scores in spring 2022 in grades 4, 6, and 7 (but no longer 3, and still not 8).

Note. 12,256 observations (representing 694,136 students) in 4,221 schools. *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.10$

Link to All

ELA: Mean Scale Scores for Economically Disadvantaged Subgroup (Subset), Nonvirtual and Virtual



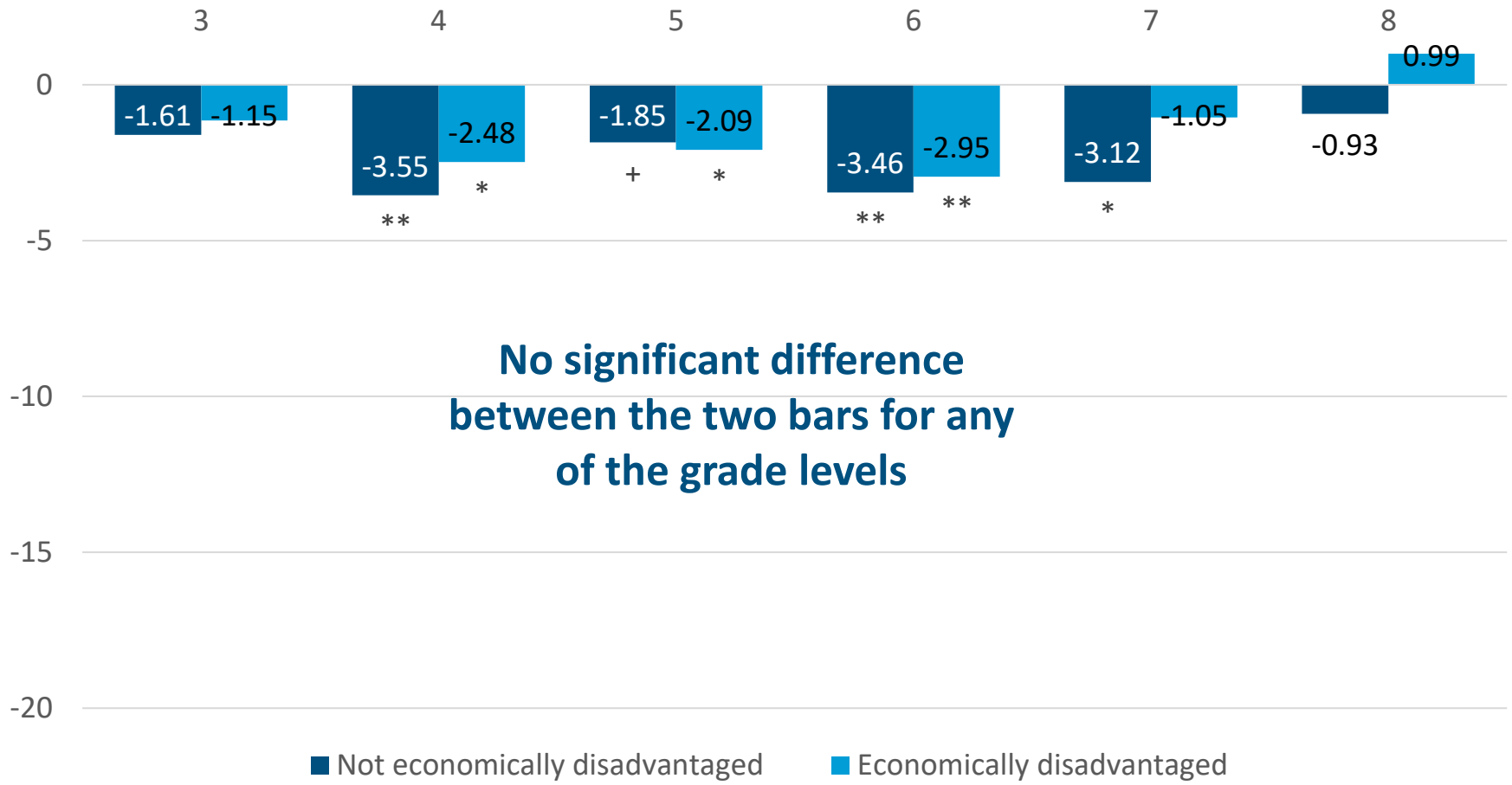


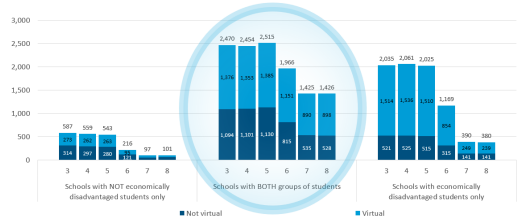
In the subset schools: For economically disadvantaged students, being virtual in 2020-21 was associated with lower ELA scores only in grades 4, 5, and 6 (as compared to in all grades except 8th in the all-schools sample).

Note. 12,256 observations (representing 848,641 students) in 4,221 schools. *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.10$

Link to All

ELA: Estimated Effect of Being Virtual for Both Groups (Subset)



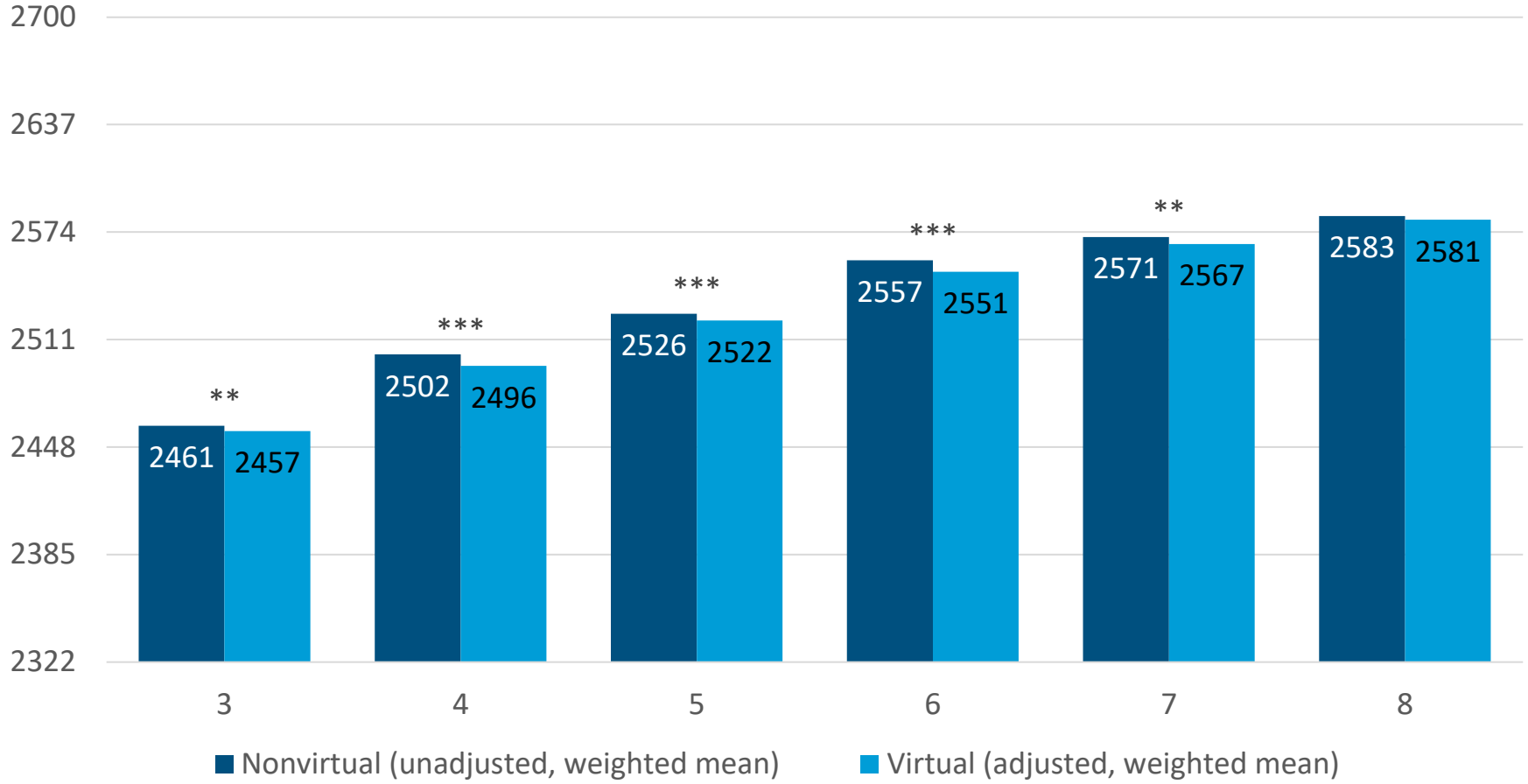


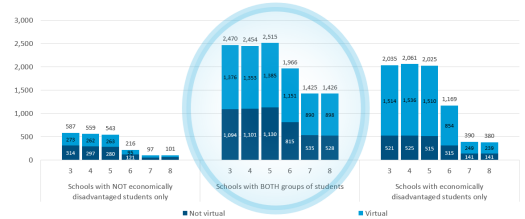
In the subset schools: For ELA, in no grade level is the disadvantaged estimate significantly different from the nondisadvantaged estimate. And the differences look generally smaller for the subset sample than for the all-schools sample.

Note. See previous slides for *N*s. *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.10$

Link to All

Math: Mean Scale Scores for *Not* Economically Disadvantaged Subgroup (Subset), Nonvirtual and Virtual



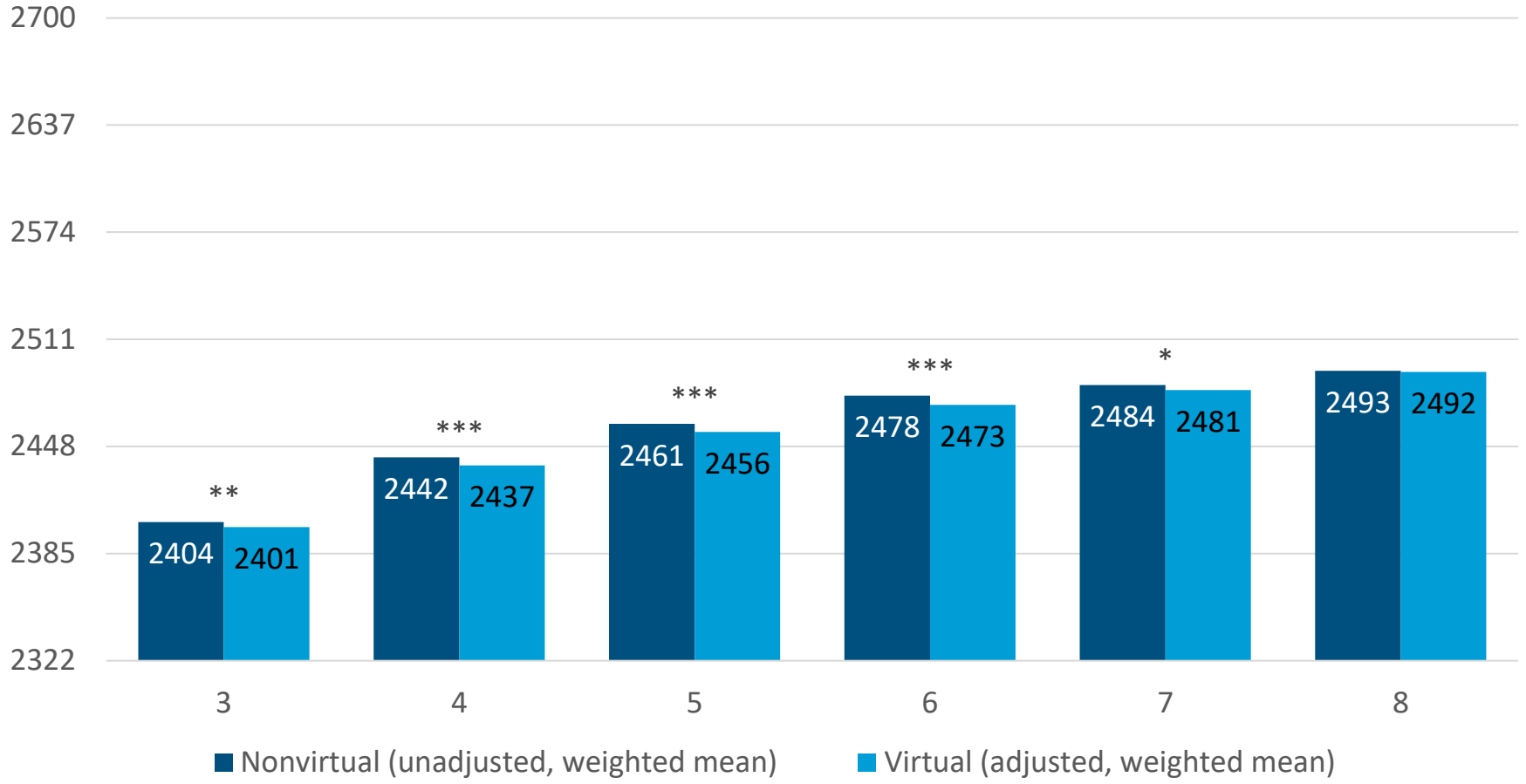


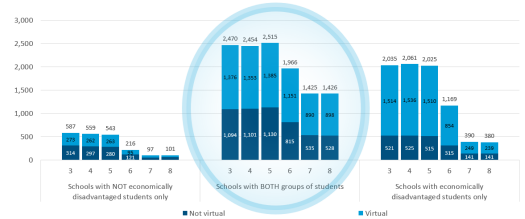
In the subset schools: For NOT economically disadvantaged students, being virtual in 2020-21 was associated with significantly lower math scores in spring 2022 in all grades except 8th. This is exactly the same as in the all-schools sample.

Link to All

Note. 12,339 observations (representing 697,879 students) in 4,248 schools. *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.10$

Math: Mean Scale Scores for Economically Disadvantaged Subgroup (Subset), Nonvirtual and Virtual



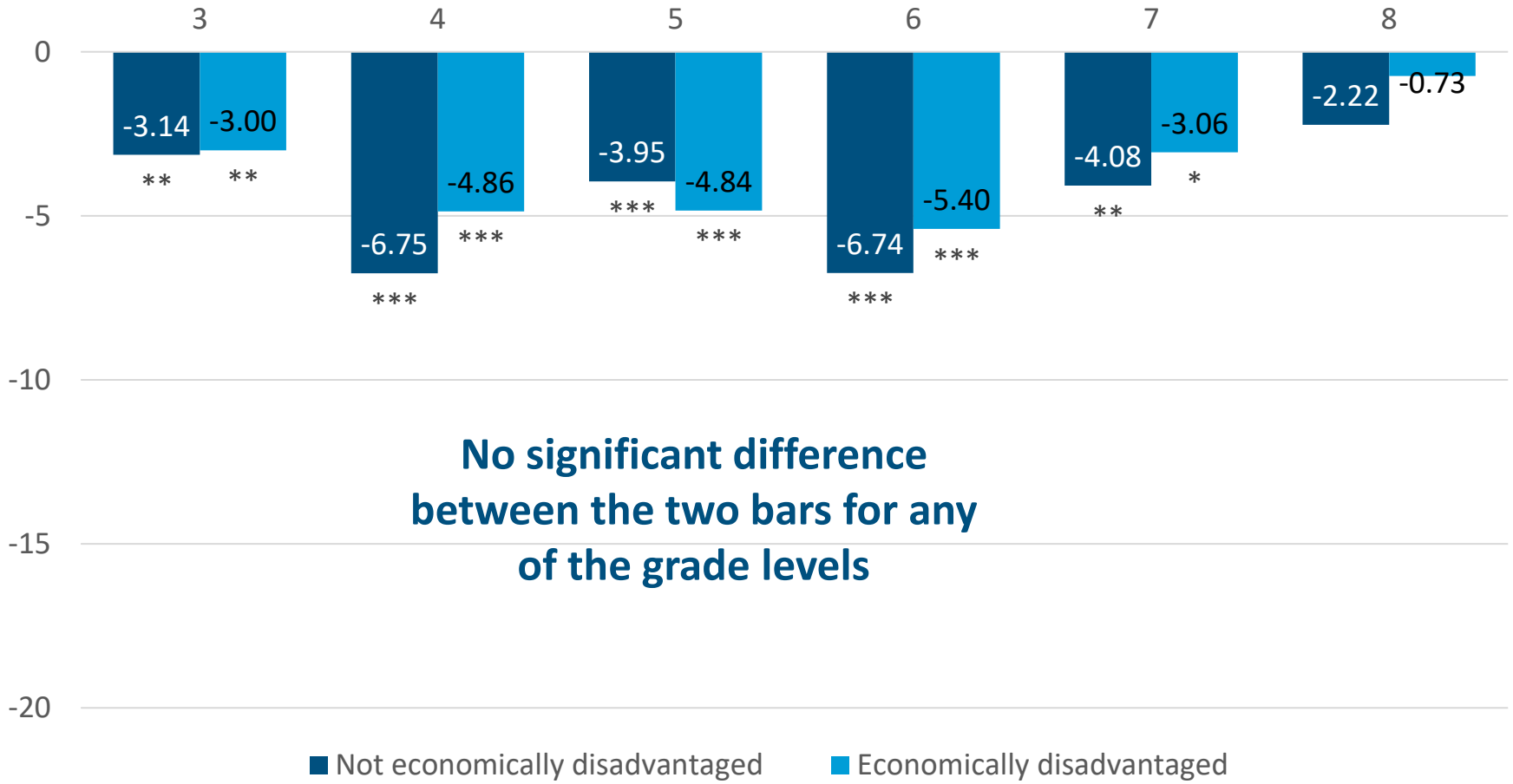


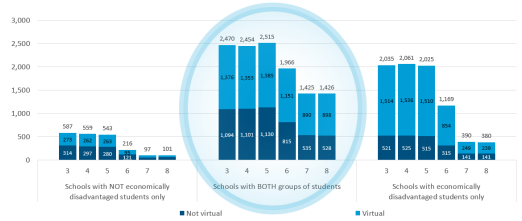
In the subset schools: For economically disadvantaged students, being virtual in 2020-21 was associated with lower math scores in all grades except 8th. (The all-schools sample had a significant difference in all of the grades.)

Link to All

Note. 12,339 observations (representing 857,356 students) in 4,248 schools. *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.10$

Math: Estimated Effect of Being Virtual for Both Groups (Subset)





In the subset schools: For math, in no grade level is the disadvantaged estimate significantly different from the nondisadvantaged estimate. (The all-schools sample had differences in grades 3 and 5.)

Note. See previous slides for *N*s. *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.10$

Link to All

Conclusion

Summary of Main Findings

- Being virtual in 2020–21 was associated with negative effects on achievement in Grades 3–7, but generally not in Grade 8.
  - This was true for both subject areas and economic subgroups (with one exception).
- The negative effects of being virtual were larger for math than for ELA.
- The negative effects of being virtual tended to be larger for economically disadvantaged students than for not economically disadvantaged students, although
  - this was only true in the elementary grades (3–5), and
  - it was NOT the case when we restricted the sample to schools that had both groups ("subset").

Limitations/Further Research

- Not student-level data
- Causal inferences not warranted
- Outcomes are a year later
- Only one state (California)
- Schools in the “nonvirtual” sample may still have been virtual for part of the year
- Composition of the economic status subgroups may have shifted

Implications

- Don’t throw the baby out with the bathwater.
- Identify and study schools that were more successful with remote learning.
- Continue to promote and invest in wider broadband and technology access, particularly in more impoverished areas.
- Envision creative classroom technology solutions.
- Continue to work on reducing achievement disparities more generally.
- Young children are a tough nut to crack.

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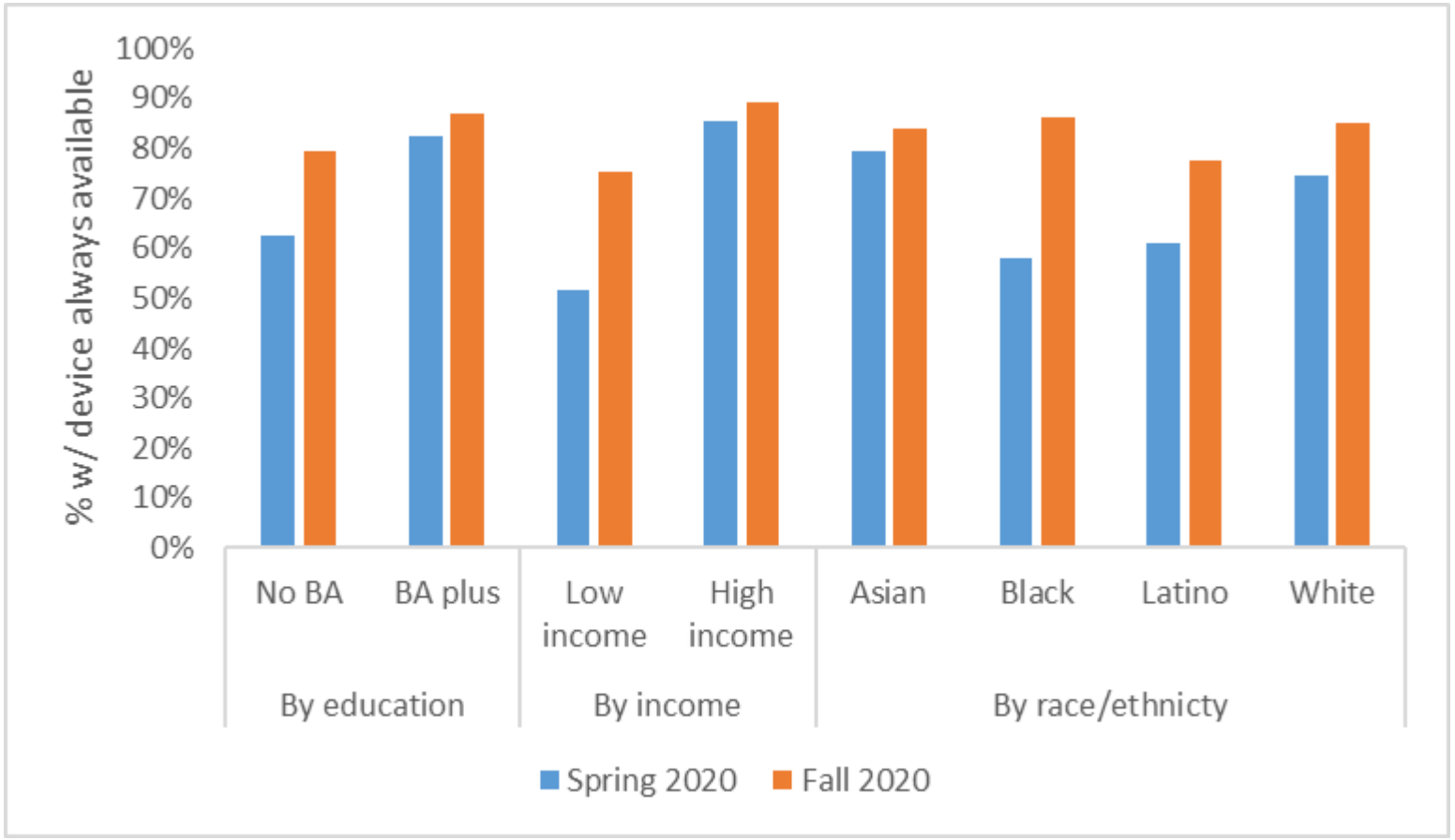
Digital Equity Gaps in California's K–12 Schools

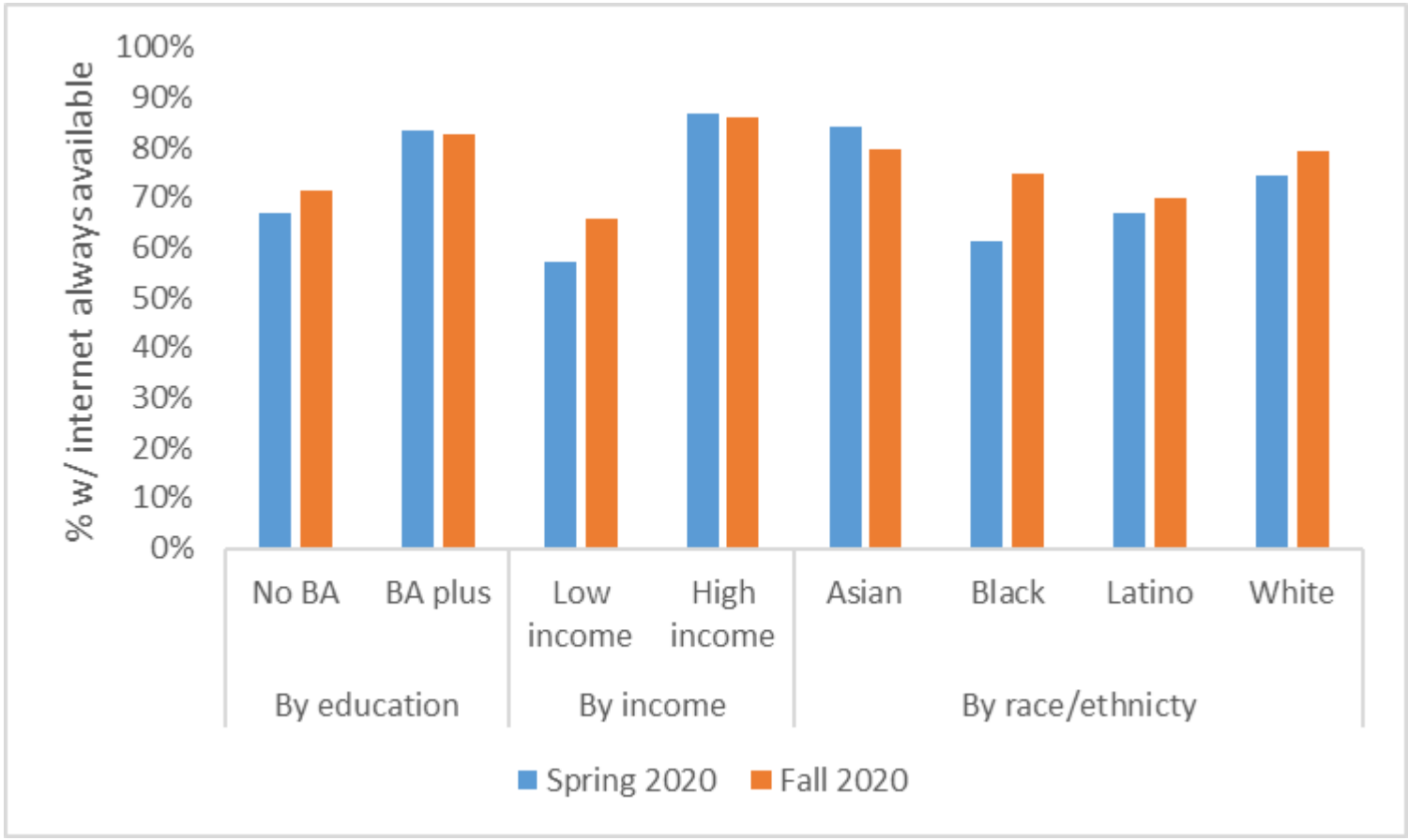
Niu Gao, Principal Researcher, AIR

Significant Improvement in Device Access



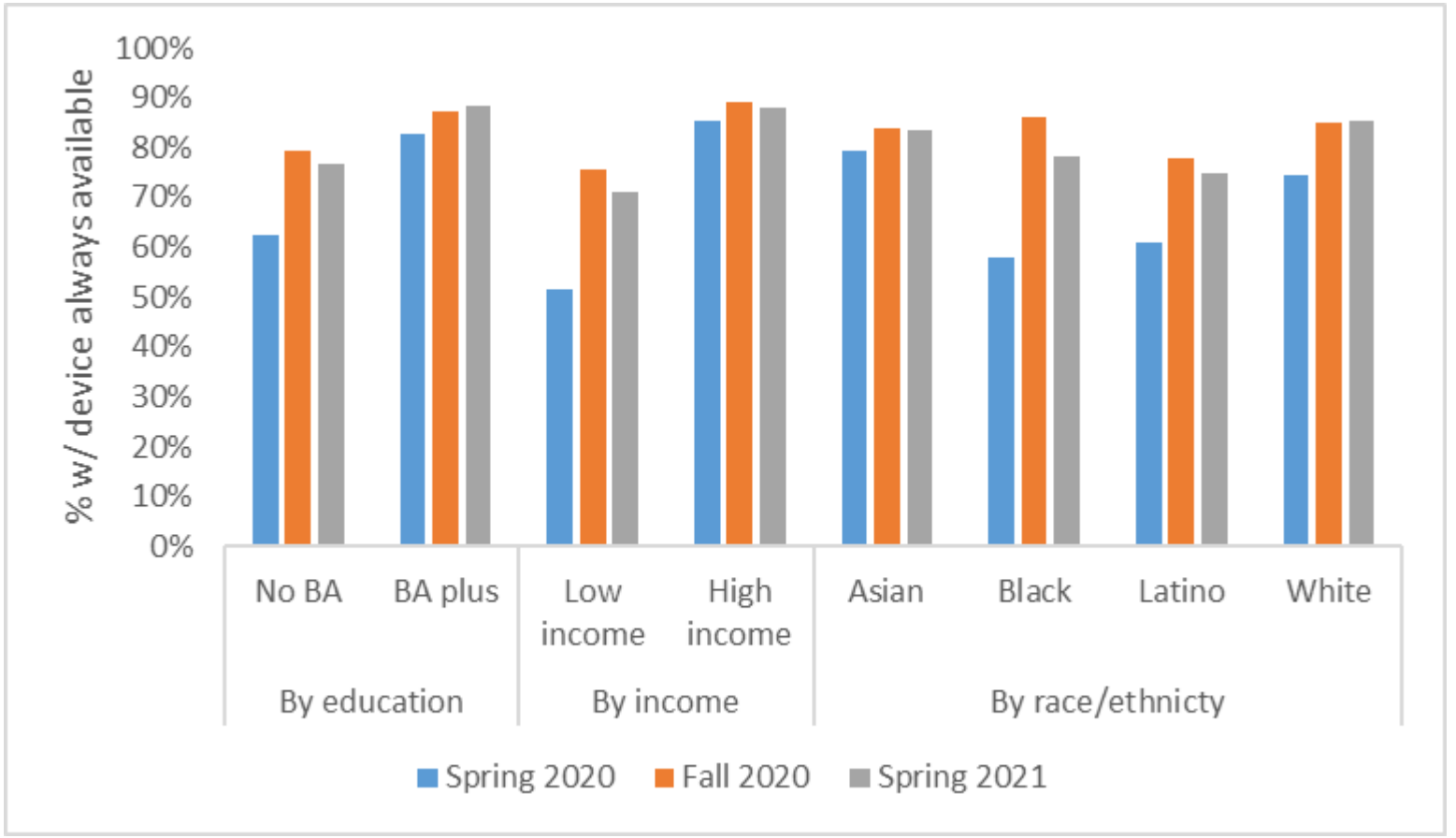
Source: Hayes, J., & Gao, N. (2021). *Achieving digital equity for California's students.* Public Policy Institute of California. https://www.ppic.org/publication/achieving-digital-equity-for-californias-students/

Modest Improvement in Internet Access



Source: Hayes, J., & Gao, N. (2021). *Achieving digital equity for California's students.* Public Policy Institute of California. https://www.ppic.org/publication/achieving-digital-equity-for-californias-students/

Progress Stalled in Spring 2021

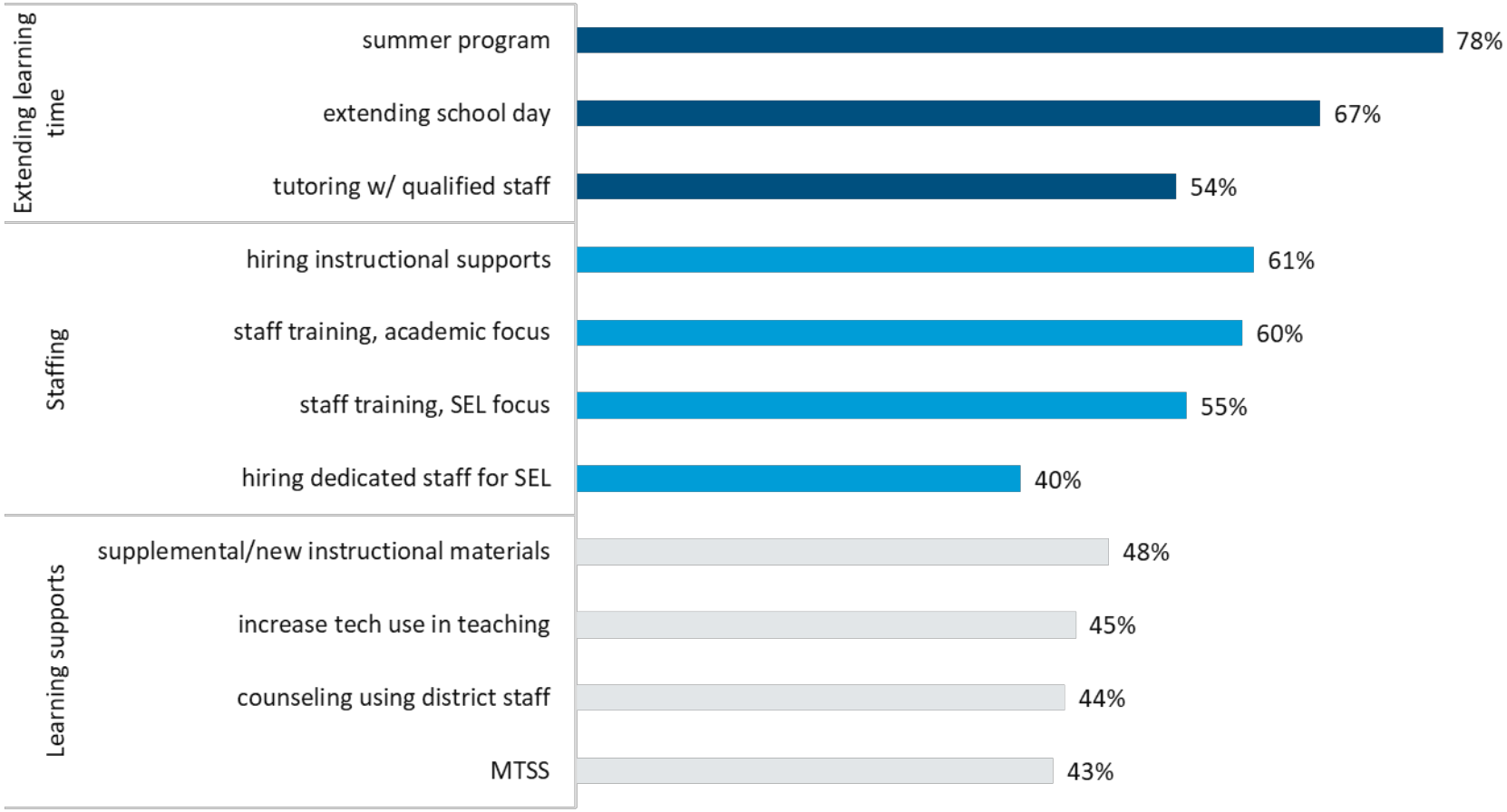


Source: Hayes, J., & Gao, N. (2021). *Achieving digital equity for California's students.* Public Policy Institute of California. https://www.ppic.org/publication/achieving-digital-equity-for-californias-students/

Learning Recovery Strategies in California

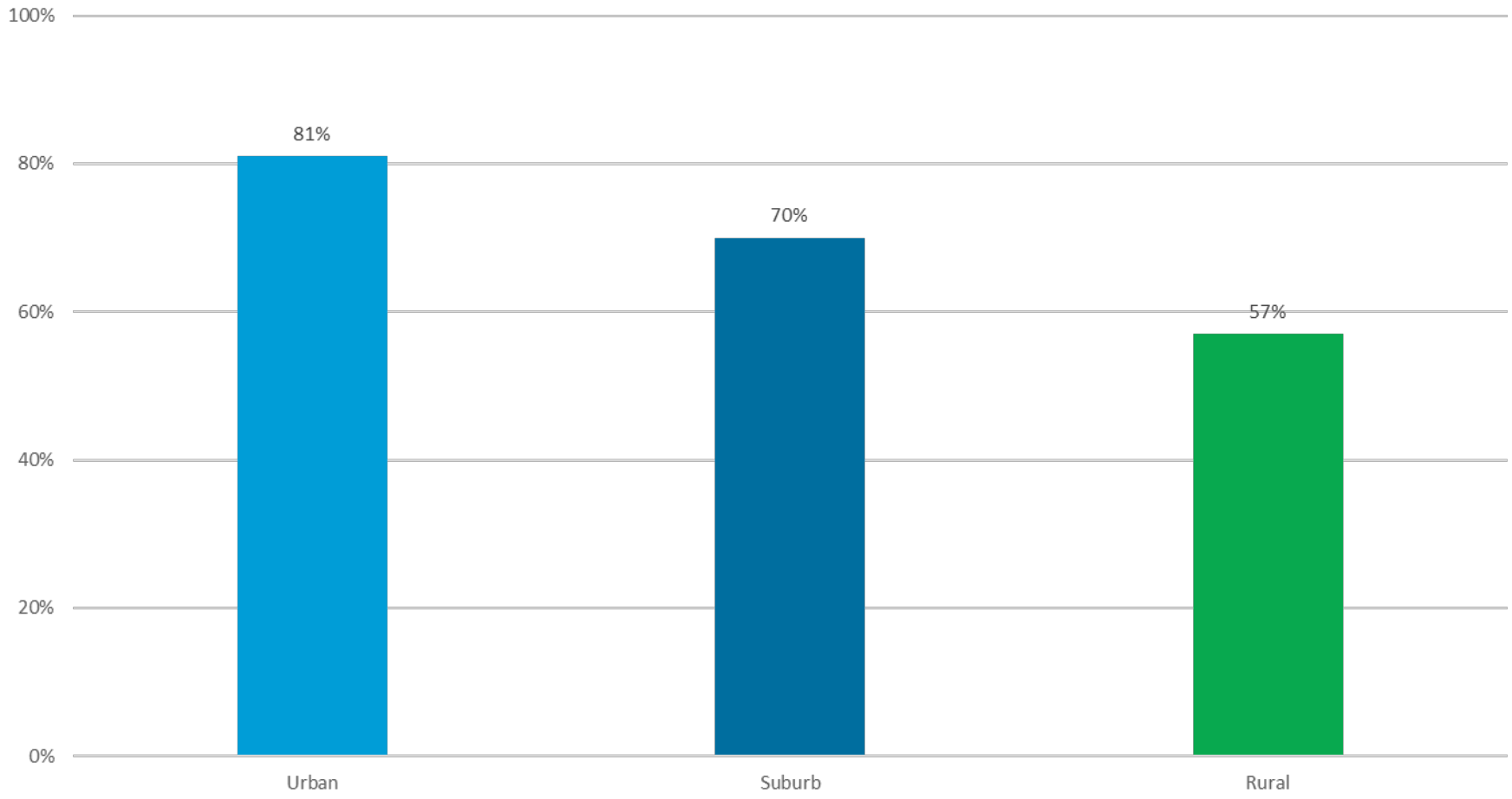
Jonathan Isler, Administrator, Office of Research Requests and Partnerships,
California Department of Education

Most districts spent federal and state stimulus dollars to extend learning time and support staffing.

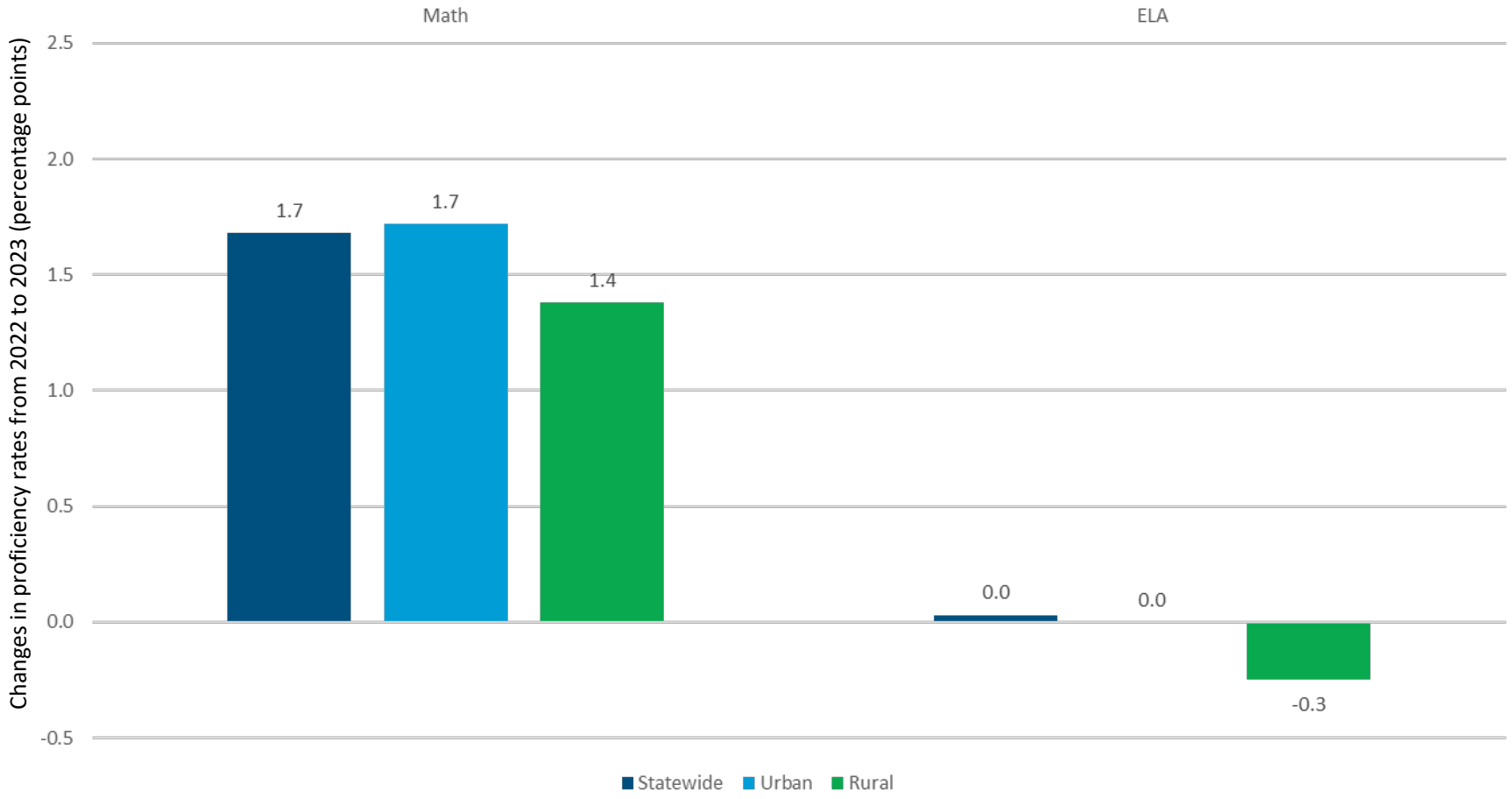


Note. SEL = social-emotional learning; MTSS = multi-tiered system of supports.

Rural districts are less likely to extend school day.



Economically disadvantaged students in rural areas are falling further behind.



Questions and Answers

Closing and Survey

Webinar Feedback

- We would love to hear your thoughts on this webinar so that we can continue to improve and grow.
- Please complete a short 2-minute survey as you sign off or on your own time.

Thank You