

E-learning during pandemic in U.S & how can we **carry out our business?**

September 17th 2022



Background



An edtech company provides online courses in

3 main areas:

- Career development
- High school and above
- Content creation

How e-learning shifted in U.S during pandemic?

Long-term business strategy

Overview



Target audience

Business Development
/Marketing
/Academic teams



Metric

SES
(SocioEconomic Status) score



Flow of analysis

What is SES? →

EDA on
components
of SES score



Segmentation
by 3 main
product
functions



Recommendation



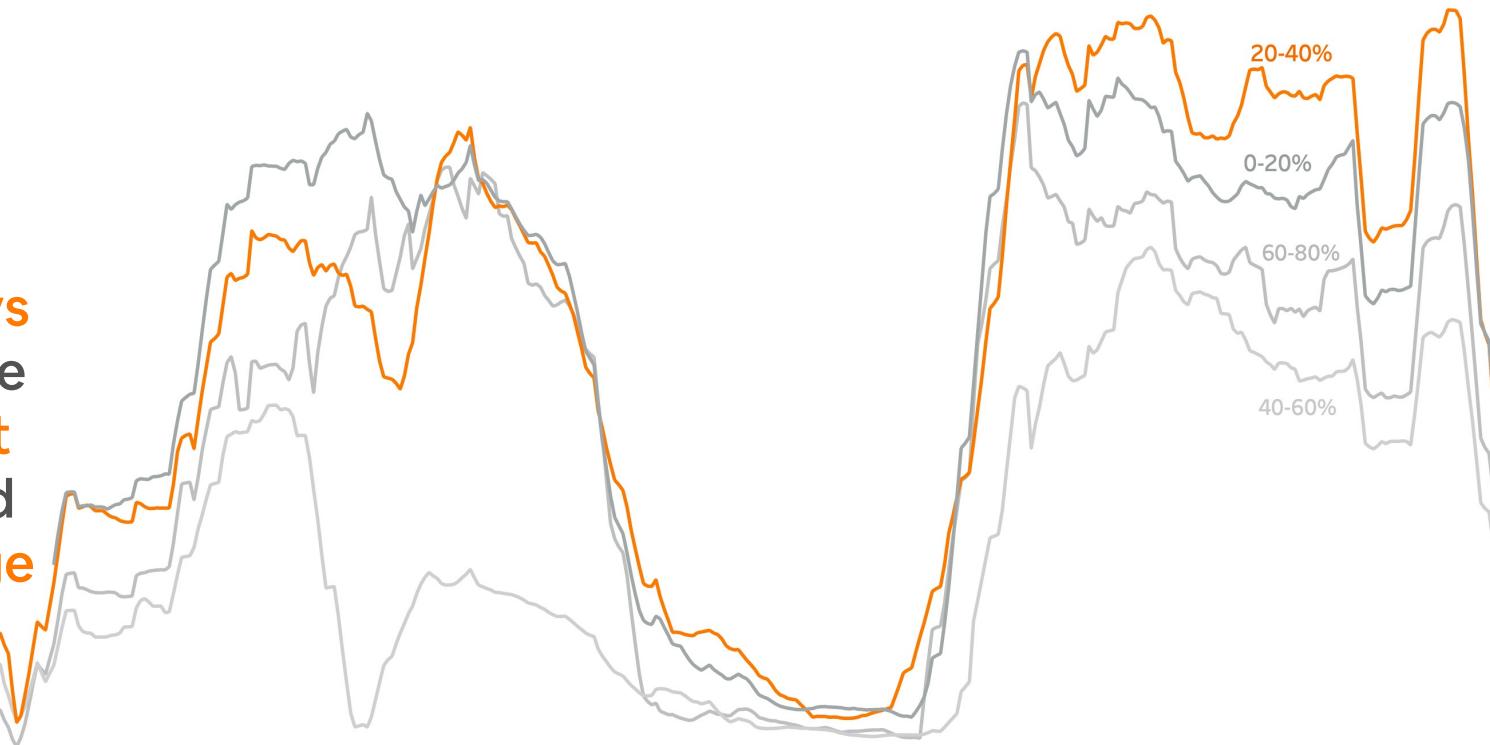
SES = Ethnicity score + Economic Status score + Expenditure score



Result of ranking based
on “Percent of days
with greater
engagement”



Count **number of days**
one group getting the
highest engagement
rate of all groups and
convert to **percentage**





Explore trends
on components of
SES

Outline



Change **over time**
between groups



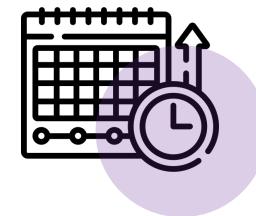
Statistical summary and
comparison between
2 periods



Pre-outbreak
January 1st ->
April 28th



Outbreak
September 1st ->
December 18th

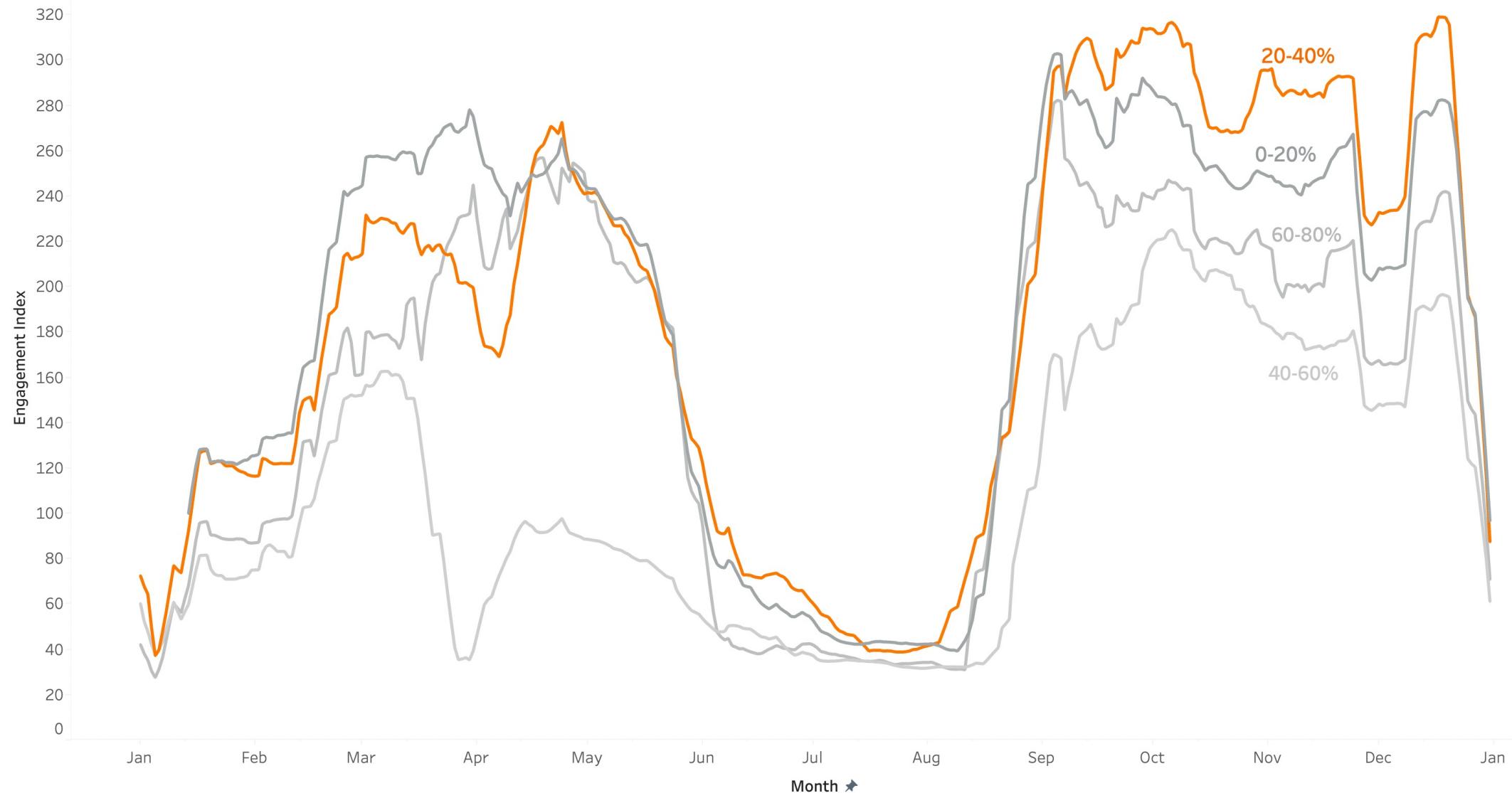


Percentage of days with
greater engagement
between groups

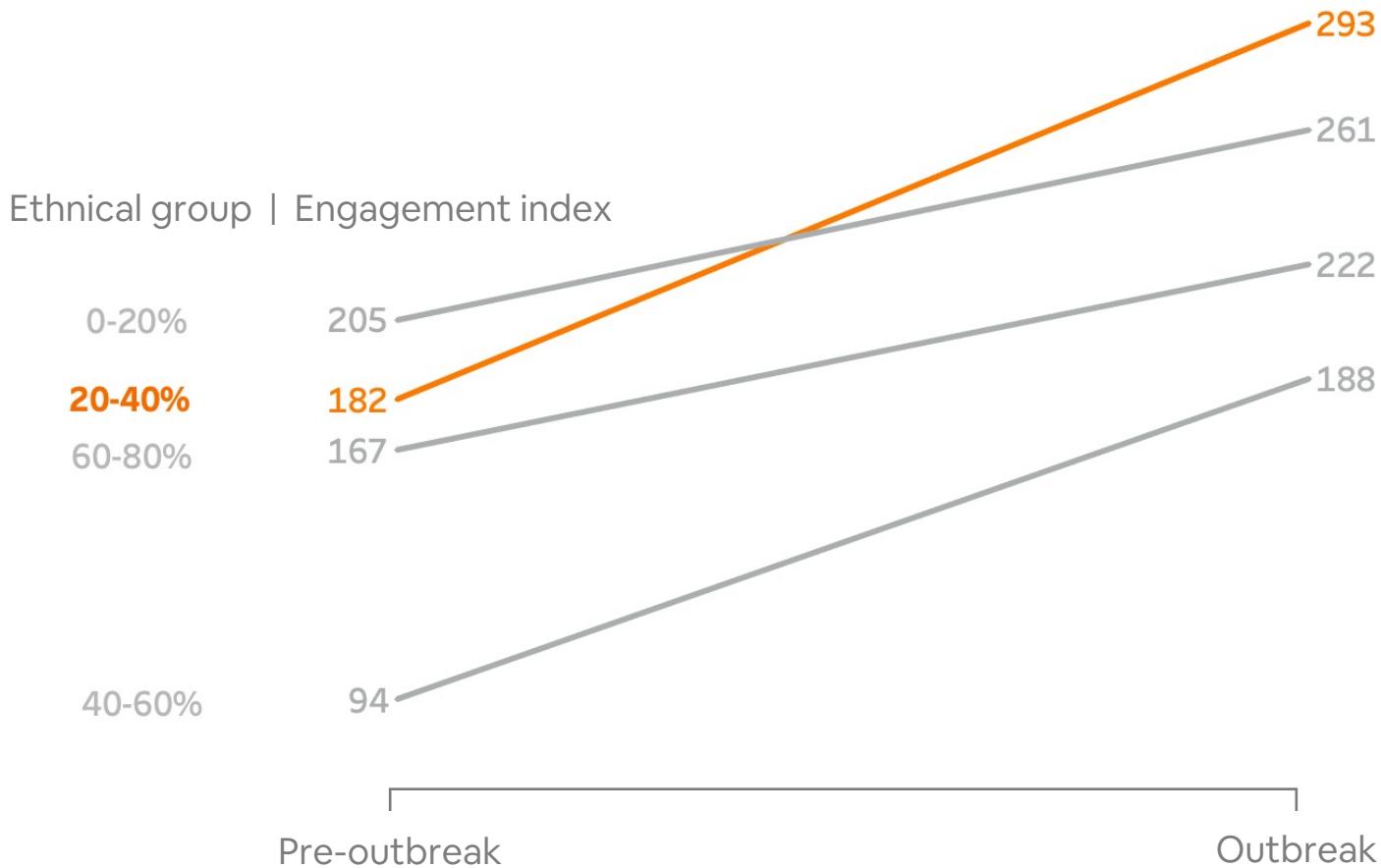
Ethnicity



Districts with **mostly white students** surprisingly have **lower engagement rate** than the ones with **partical Black/ Hispanic communities**



Districts with **partical Black/ Hispanic** communities stands **secondly** in **Pre-outbreak** but then become the groups with **highest engagement index** in **Outbreak** period

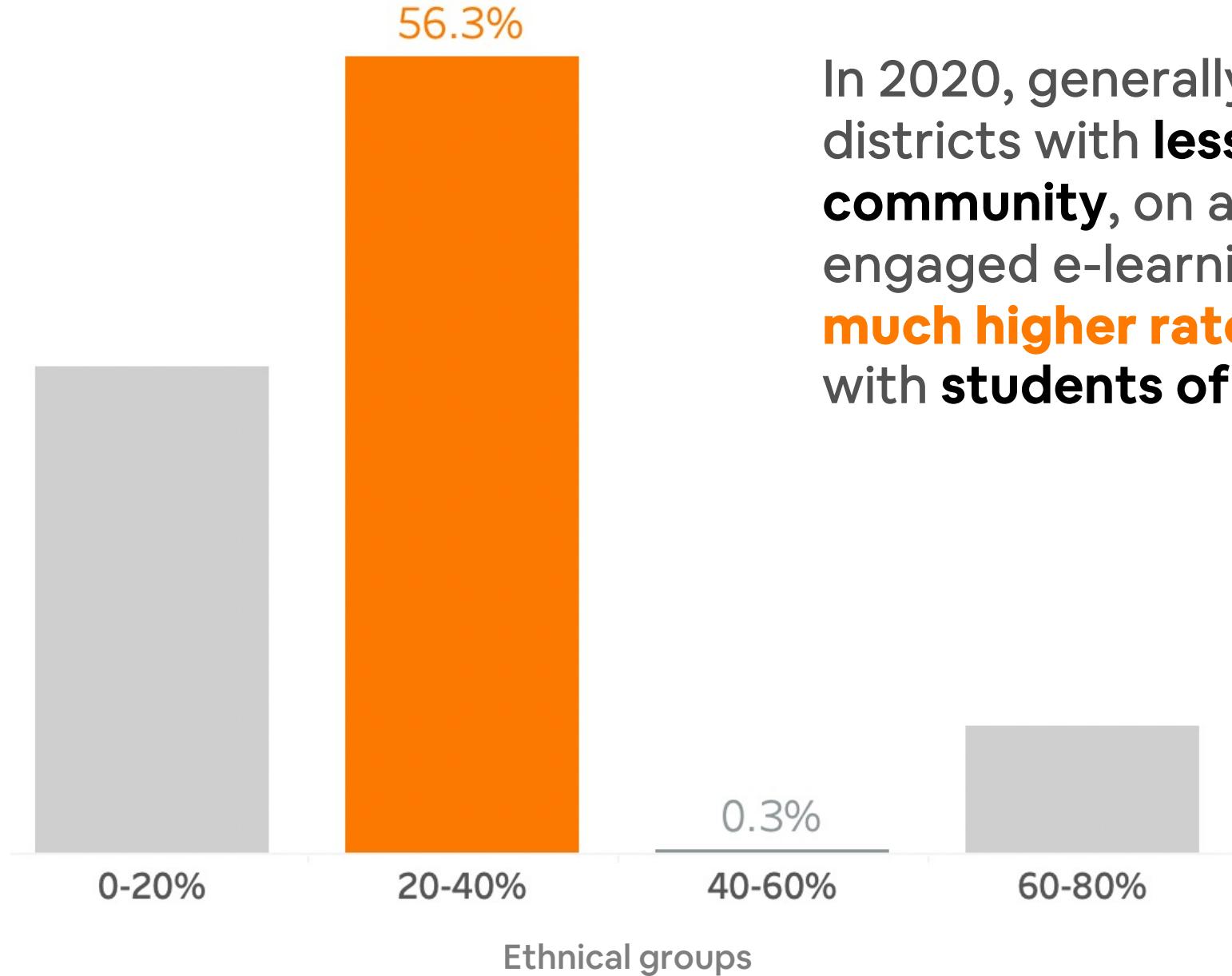


Statistical test result

Ethnical group	t-value	p-value
0-20%	-3.314478257	0.001069*
20-40%	-6.818276001	0.000000*
40-60%	-8.63108758	0.000000*
60-80%	-3.415411747	0.000755*

There is **difference** between 2 means in 2 periods. This pattern of change is **significant**

FIGURE 3.1.2 Trend in engagement index between ethnical groups in 2 periods during pandemic



In 2020, generally, students in districts with **less multiracial community**, on average, engaged e-learning with **much higher rate** than districts with **students of color**

FIGURE 3.1.3 Percentage of days with greater engagement between ethnical groups



Economic Status

Districts with a **low rate** of students eligible for Free/Reduced Lunch tend to have **higher engagement index** most of the time

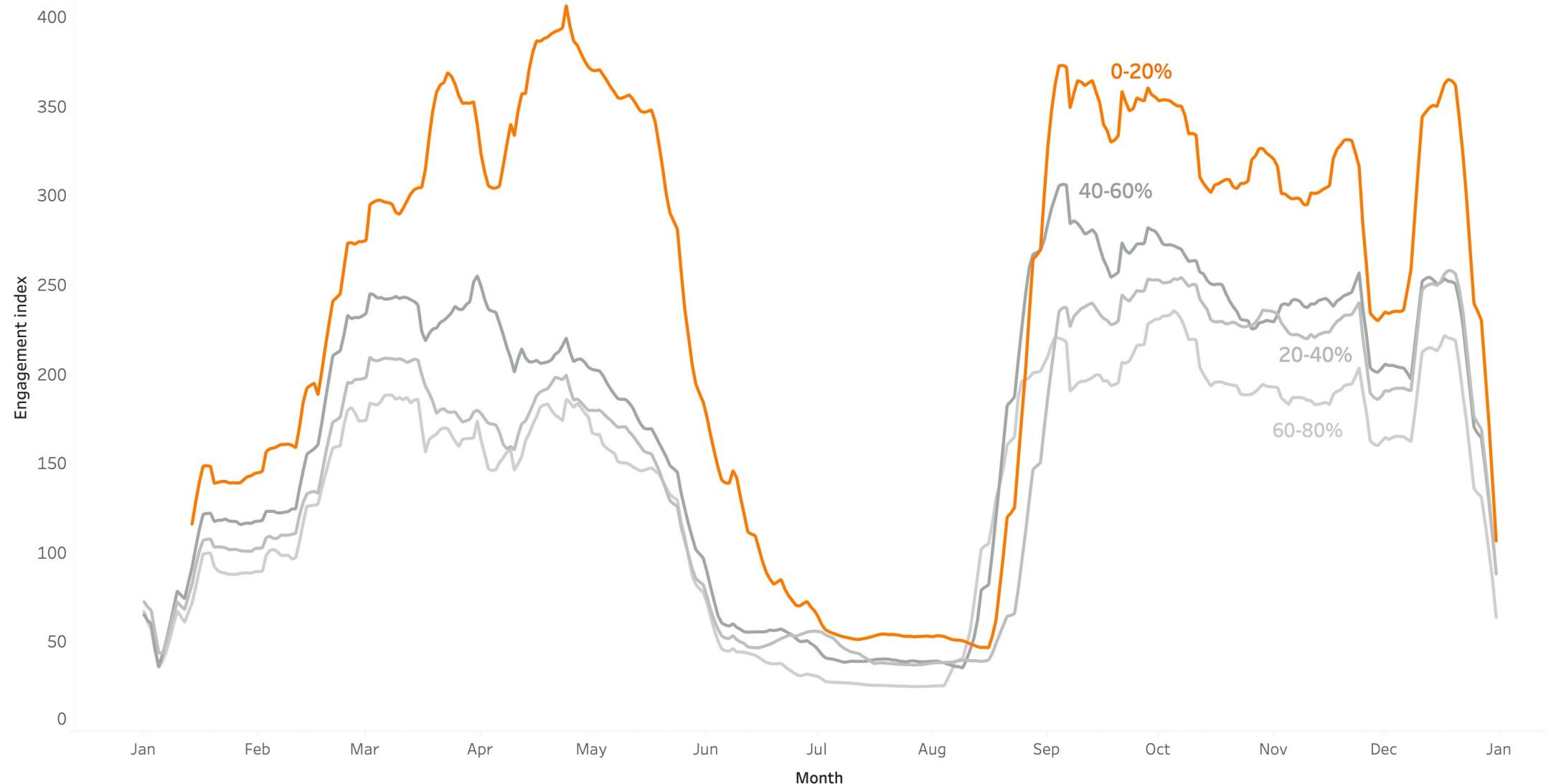


FIGURE 3.2.1 Change over time in engagement rate between vulnerable groups in 2020

Students born in **favorable economic conditions** are associated with **highest engagement index** in both 2 periods of pandemic

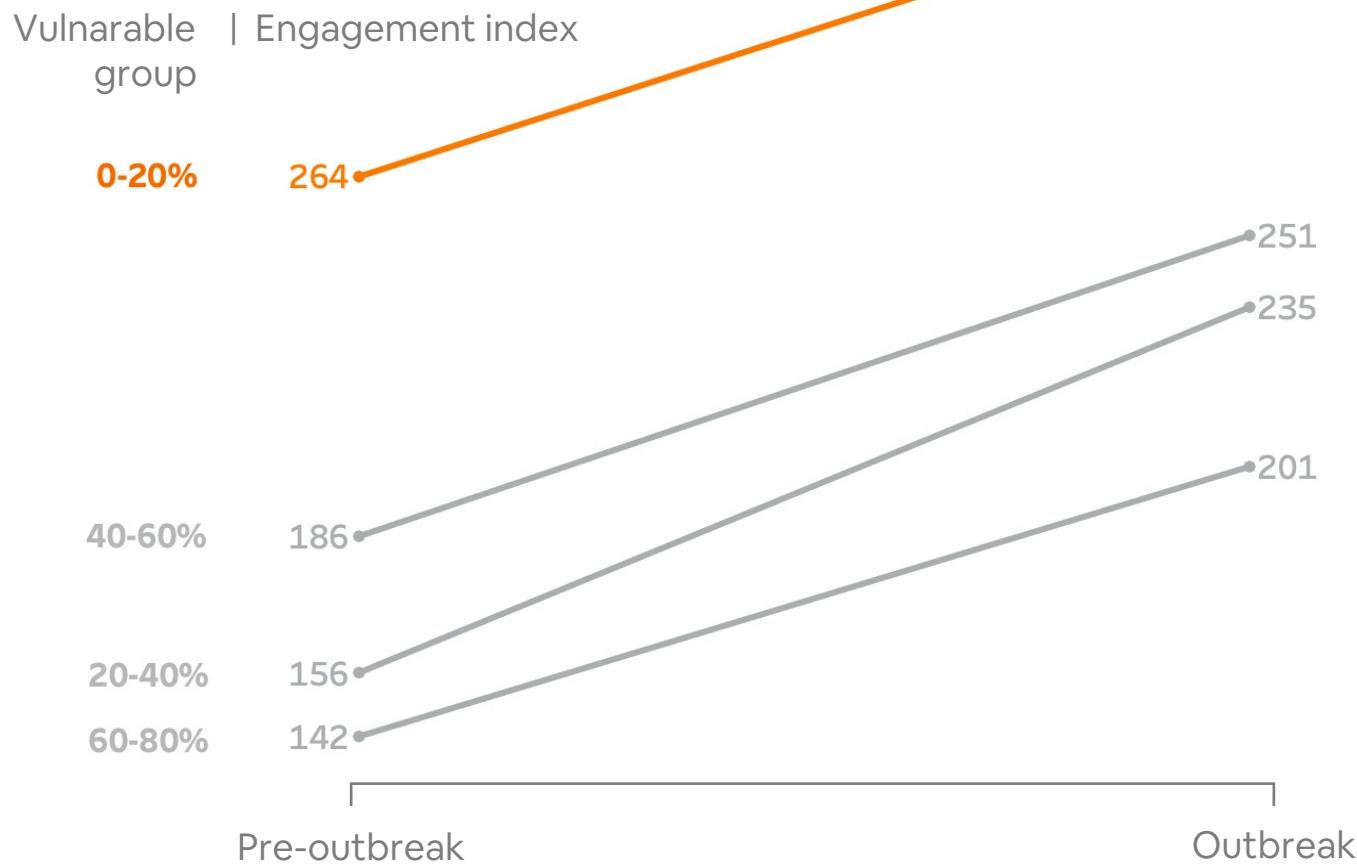


FIGURE 3.2.2 Trend in engagement index between vulnerable groups in 2 periods of pandemic



Statistical test result

Free/Reduced lunch	t-value	p-value
0-20%	-2.721795	0.006999*
20-40%	-5.878315	0.000000*
40-60%	-4.214685	0.000036*
60-80%	-4.482261	0.000012*

There is **difference** between 2 means in 2 periods. This pattern of change is **significant**

In 2020, students in **high living condition families** got **highest engagement index** while each group in the remaining achieved **less than 5%** in engagement index

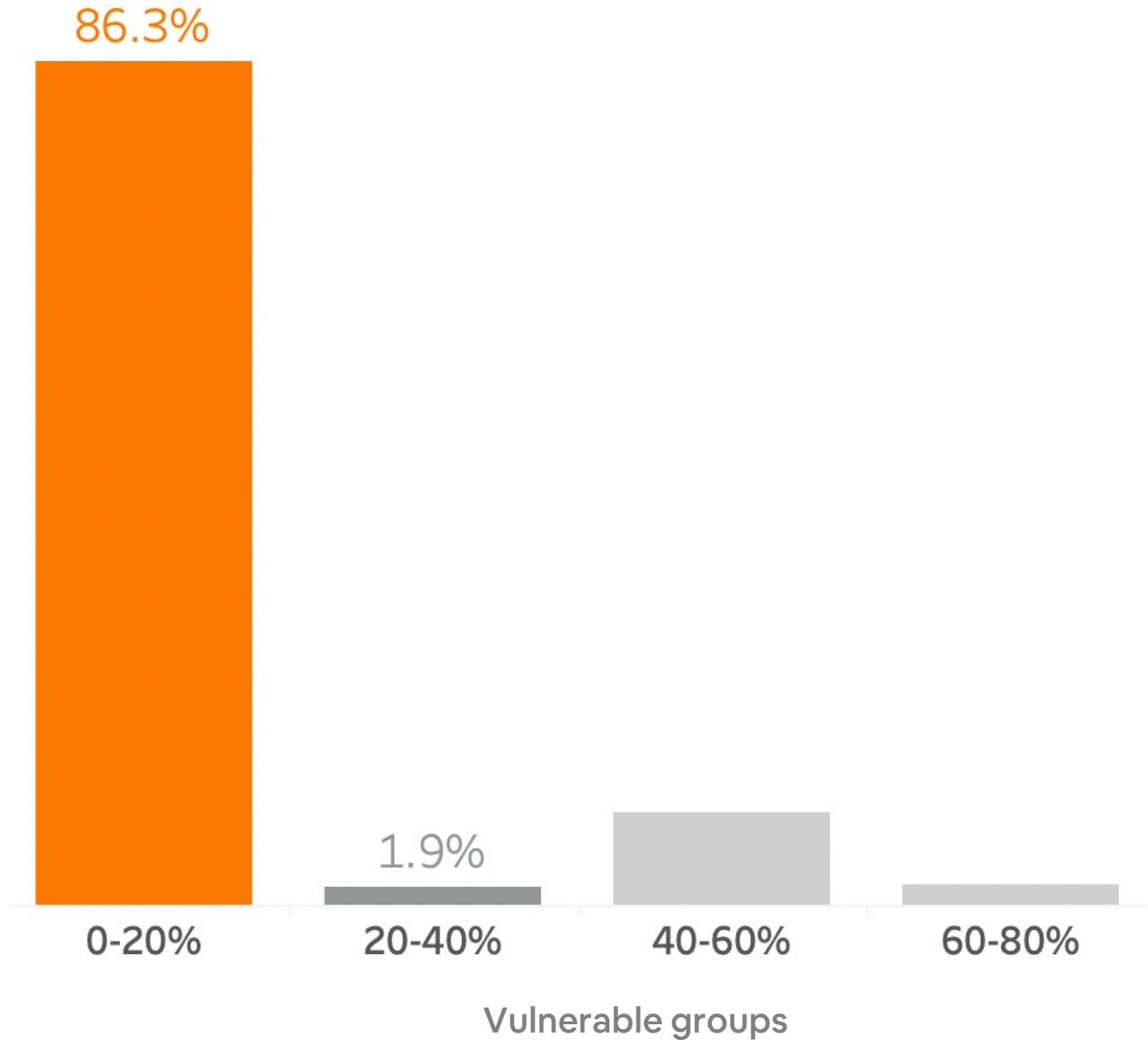
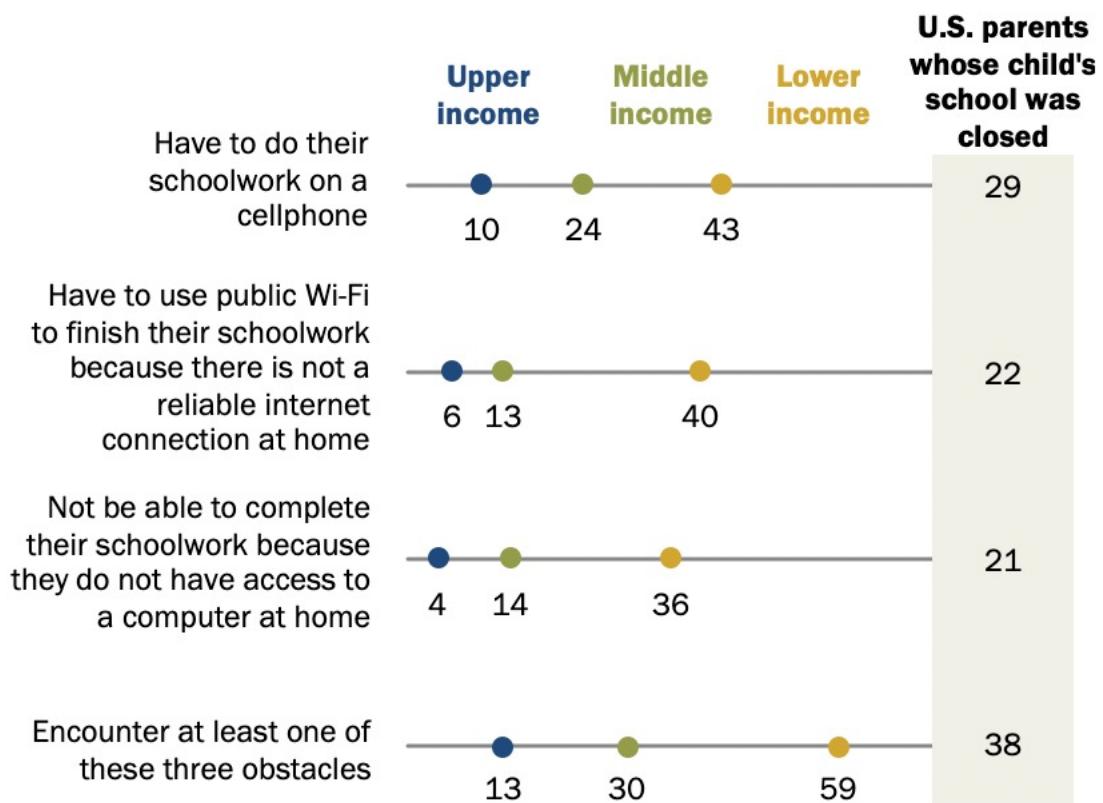


FIGURE 3.2.3 Percentage of days with greater engagement between vulnerable groups

SEPTEMBER 10, 2020

59% of U.S. parents with lower incomes say their child may face digital obstacles in schoolwork



Expenditure



Higher expenditure districts' students tend to have **from high to very high** engagement index over the time

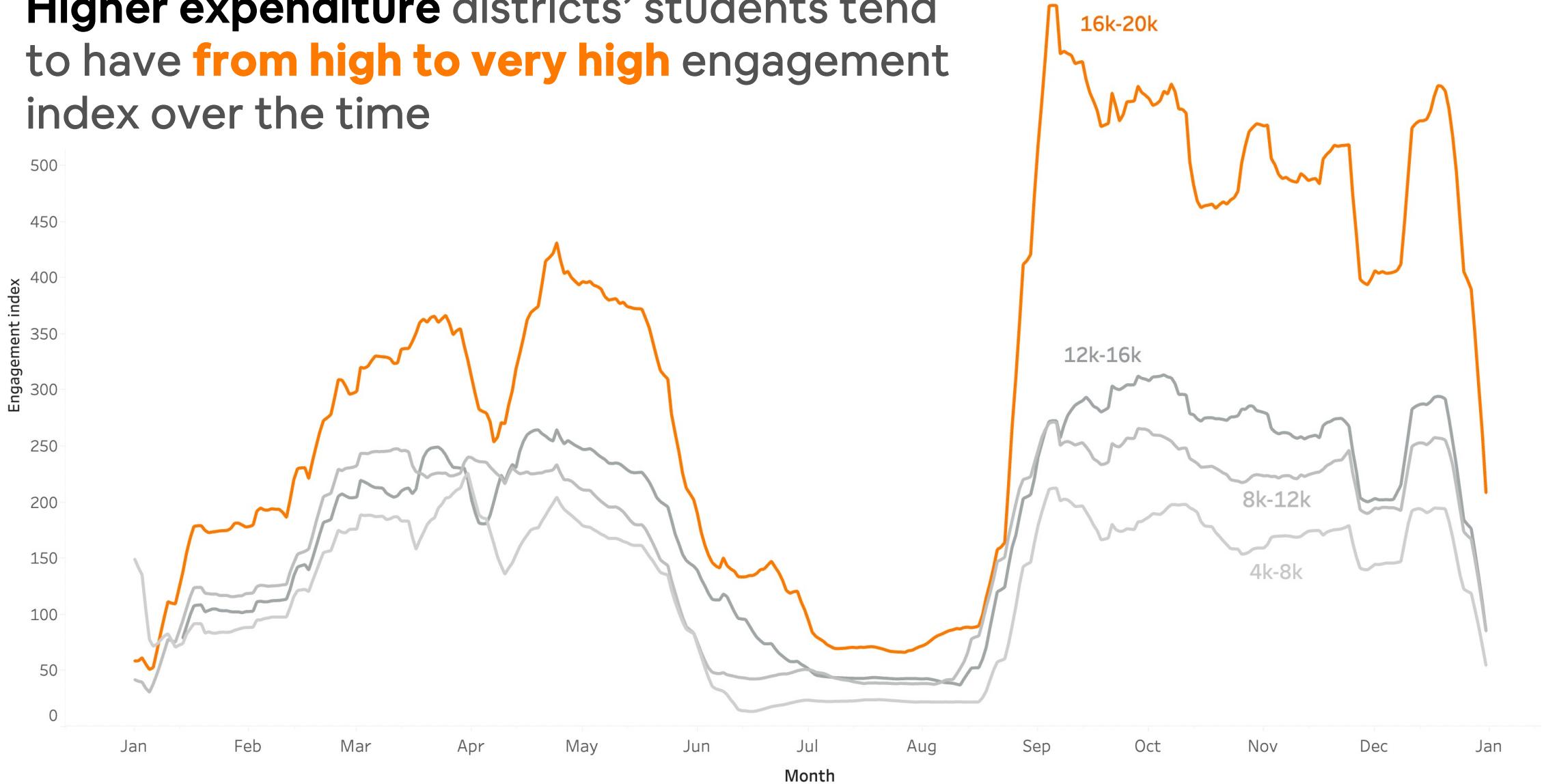


FIGURE 3.3.1 Change over time in engagement rate between expenditure groups in 2020

Students in highest expenditure
districts already and continuously **on top** of engagement index in both periods

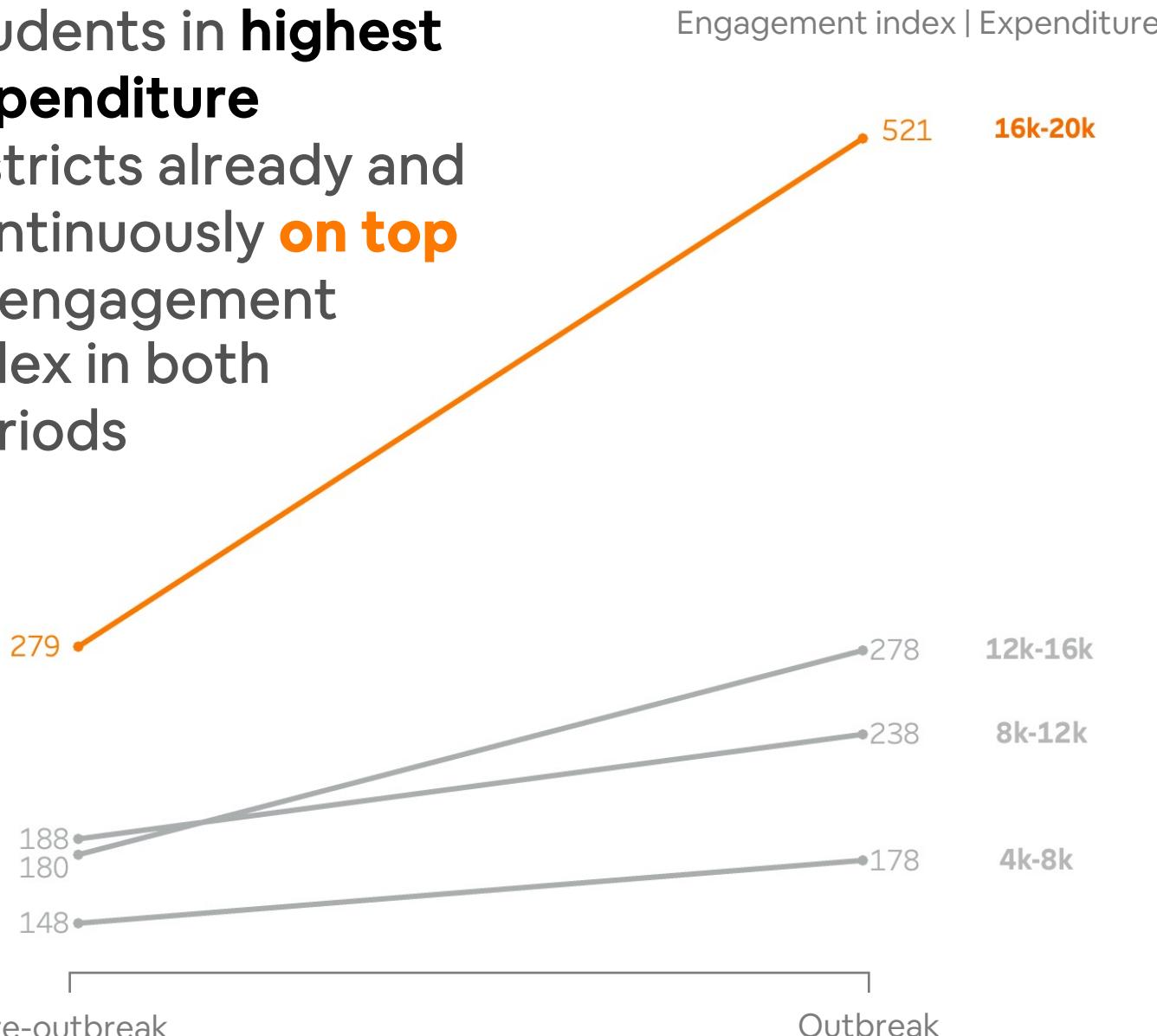


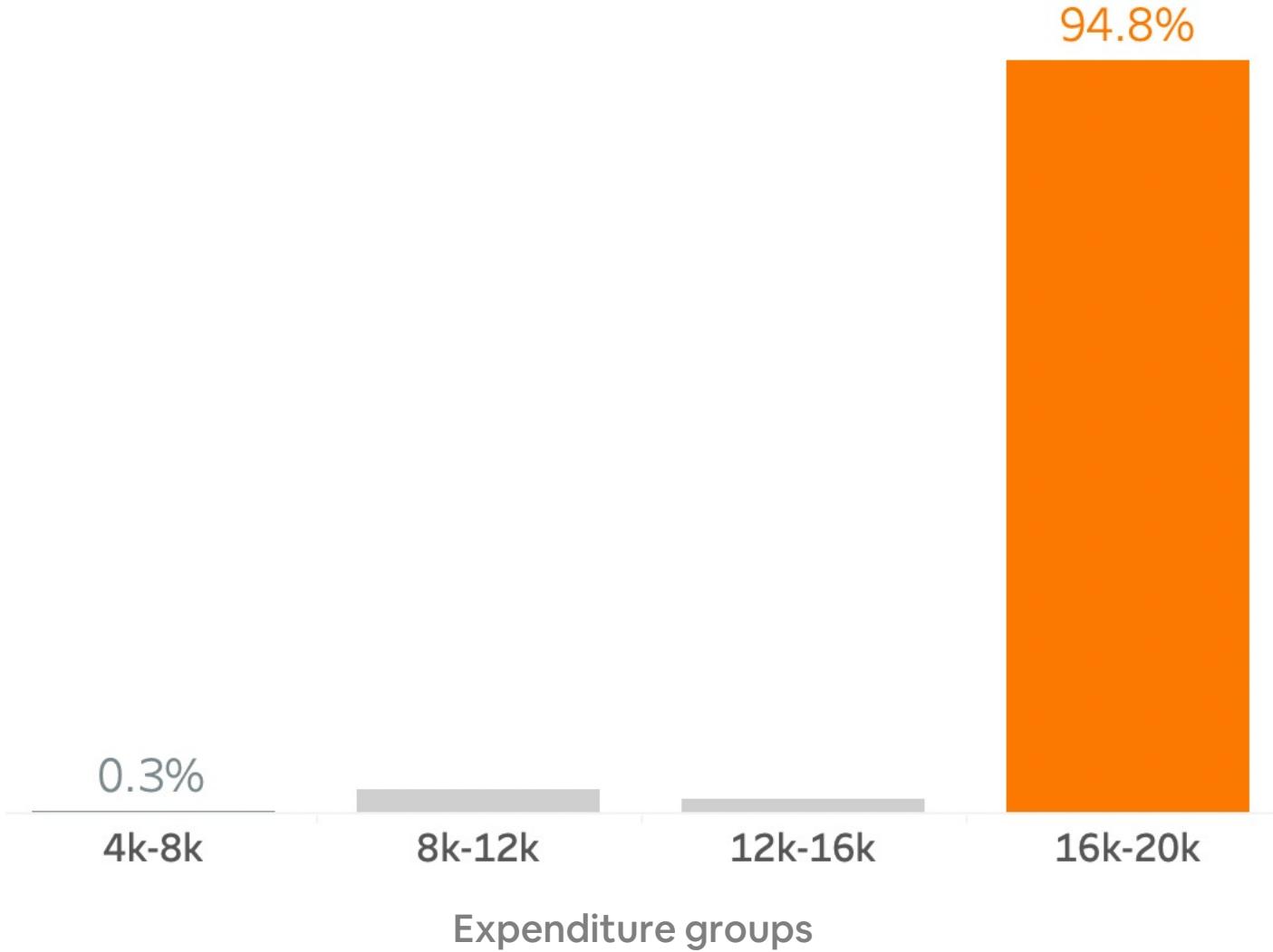
FIGURE 3.3.2 Trend in engagement index between expenditure groups in 2 periods of pandemic



Statistical test result

Expenditure	t-value	p-value
4k-8k	-5.675777	0.000000*
8k-12k	-8.285583	0.000000*
12k-16k	-2.296456	0.022566*
16k-20k	-3.296157	0.001138*

There is **difference** between 2 means in 2 periods. This pattern of change is **significant**



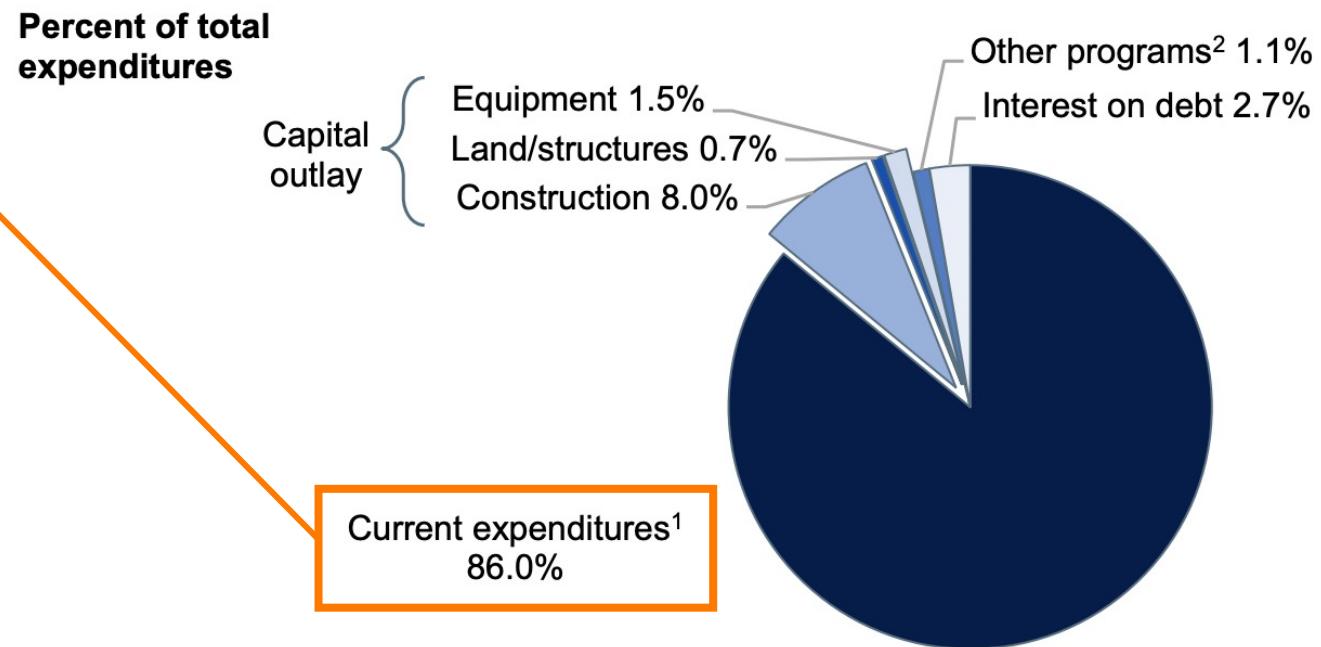
In 2020, **highest expenditure** districts' students **dominated** the engagement index while the **total rate of other 3 groups** is about 5% only

FIGURE 3.3.3 Percentage of days with greater engagement between expenditure groups

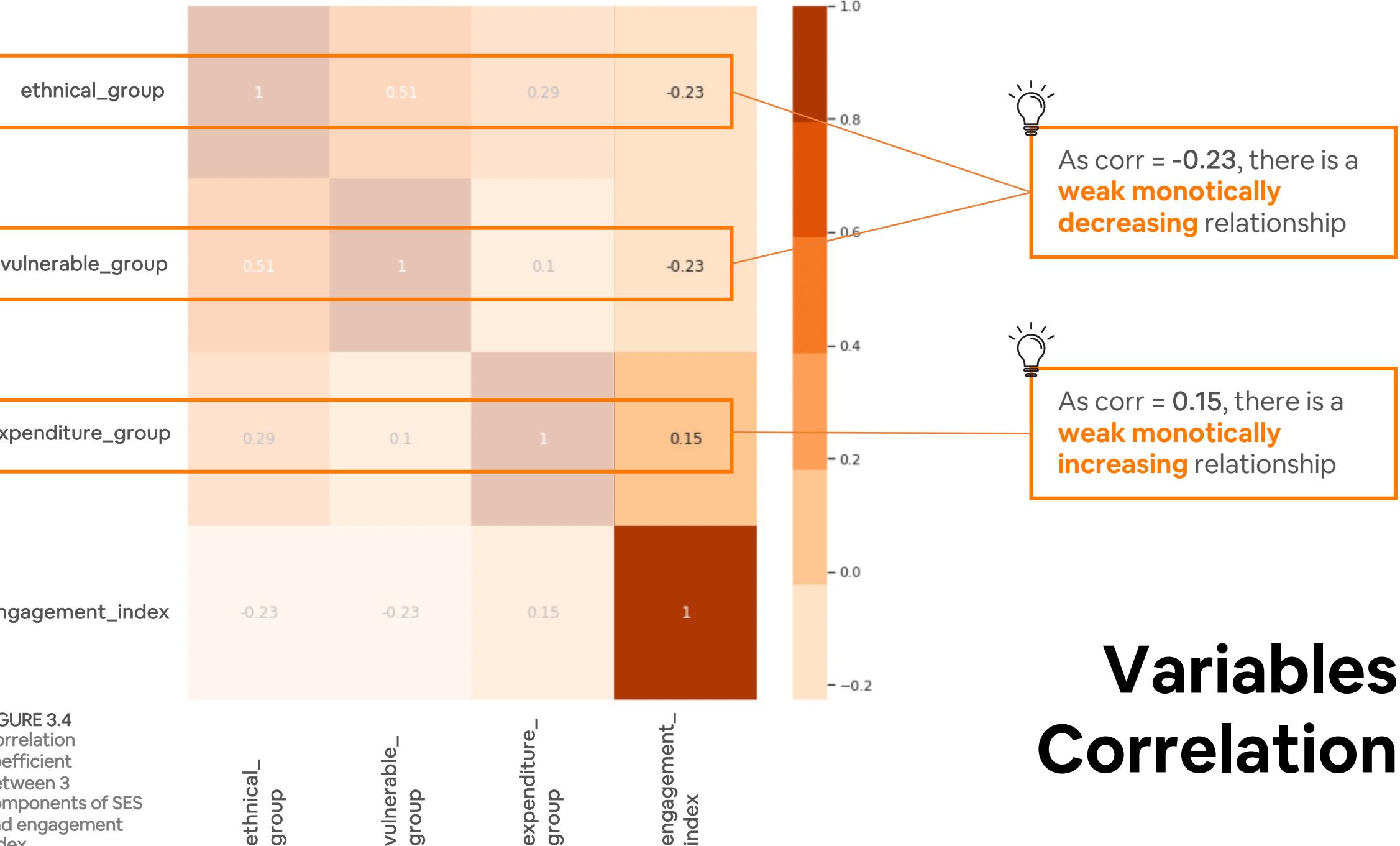
Current expenditures from federal Title I grants for economically disadvantaged students⁶ (including carryover expenditures) accounted for \$15.0 billion, or 2.2 percent of current expenditures for public elementary and secondary education at the national level in FY 20 (derived from table 8).

Nationally, Title I expenditures per pupil averaged \$297 and ranged from \$118 in Utah to \$497 in Louisiana.⁷

Figure 4. Percentage distribution of total expenditures for public elementary and secondary education and other related programs in the United States, by type of expenditure: FY 20



*Source: Revenues and Expenditures for Public Elementary and Secondary Education: FY 20 (published by Institute of Education Services – IES)



Variables Correlation

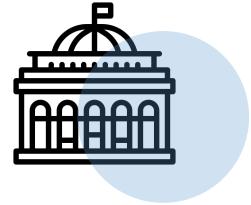
Conclusion



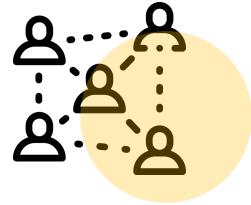
Students in districts with a **medium multiracial community** engaged e-learning even **better** than districts with **students of white**



Most of students born in **good economic condition** families engaged e-learning **more frequently** than their peers **eligible for welfare**



Students with **high engagement index** on e-learning also came from districts with **great expenditure spending** from local government



As there are **monotonical relationships** between components of SES, **demographic and economic segmentation** is good to go

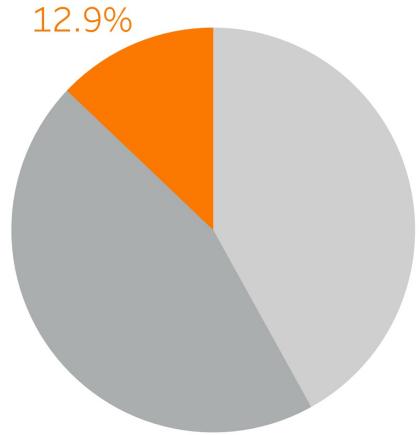
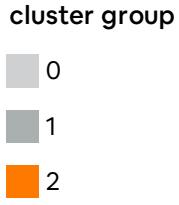
Demographic & Economic Segmentation



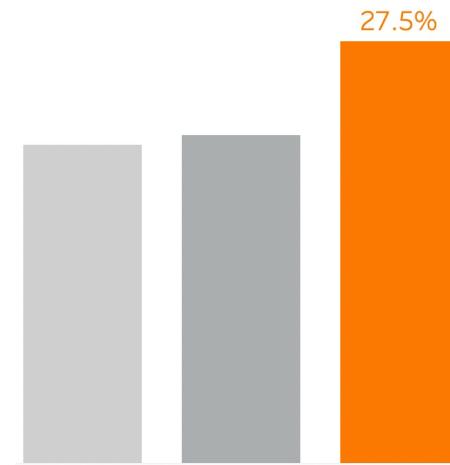
Career Planning & Job Search



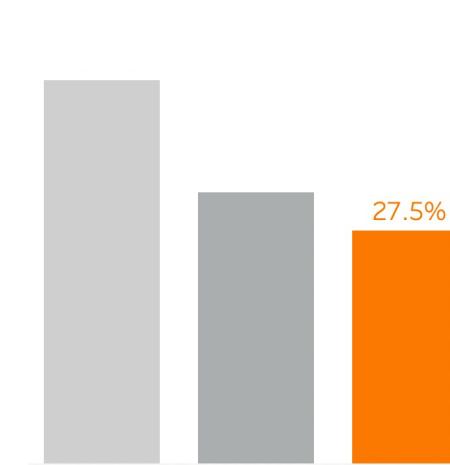
Career Planning & Job Search



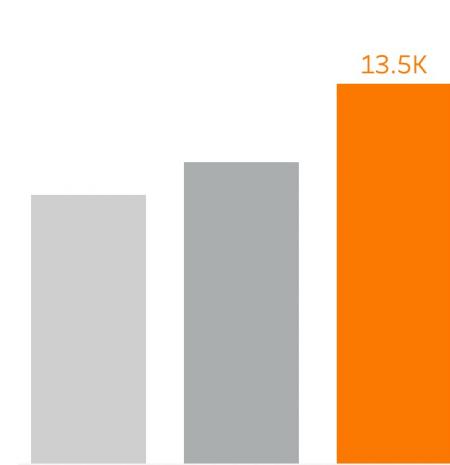
Lowest number
of districts



Relatively low average
Black/Hispanic rate

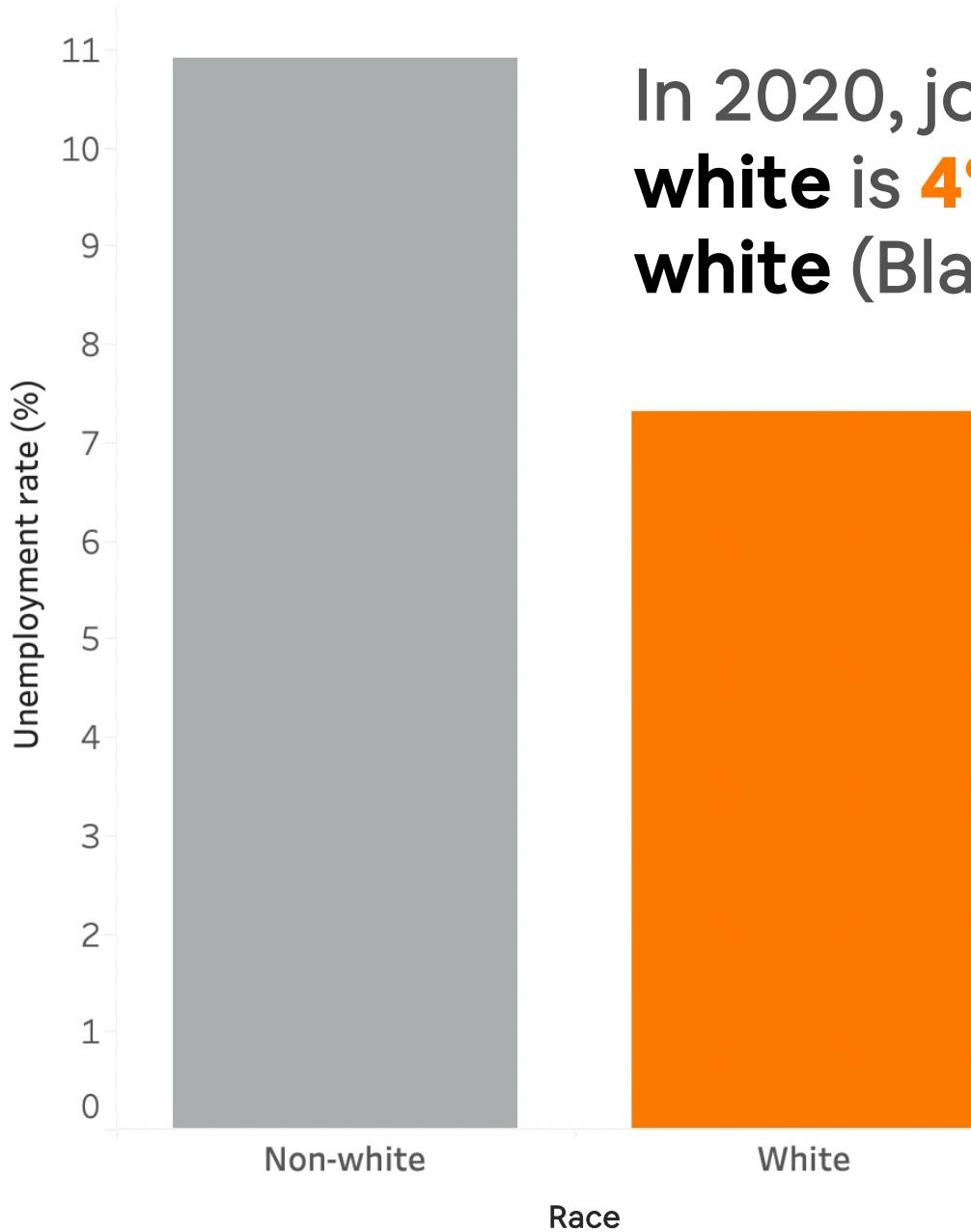


Lowest percentage of
students eligible for
Free/Reduced lunch



Highest district
expenditure

Students in districts with **low** rate of **Black/Hispanic** communities and **good economic conditions** with **great expenditure** from government have more interests in planning for their **future career and dream jobs**



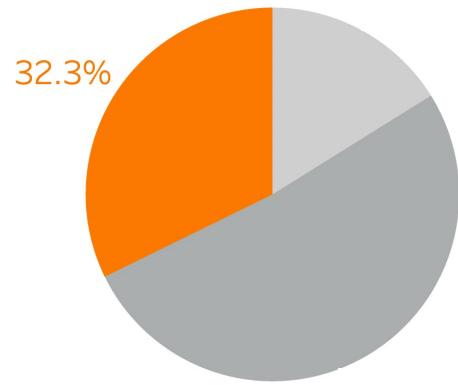
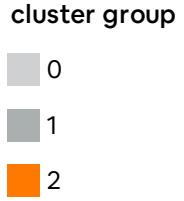
In 2020, jobless rate of people of **white** is **4% less*** than the **non-white** (Black and Hispanic) group

FIGURE 4.1.1 Unemployment rate between 2 main races in U.S in 2020

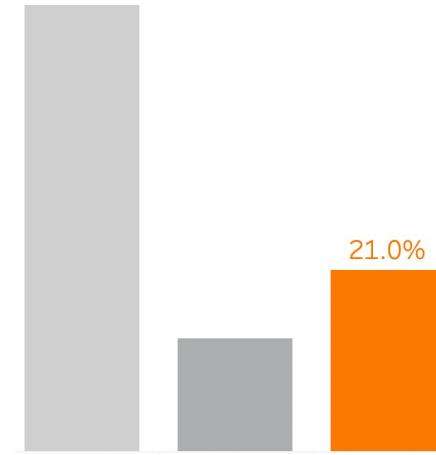
*Source: U.S. Bureau of Labor Statistics



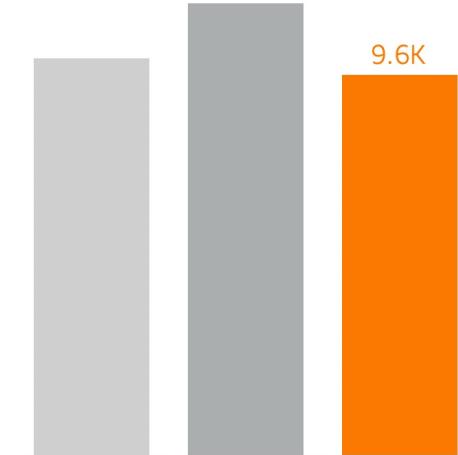
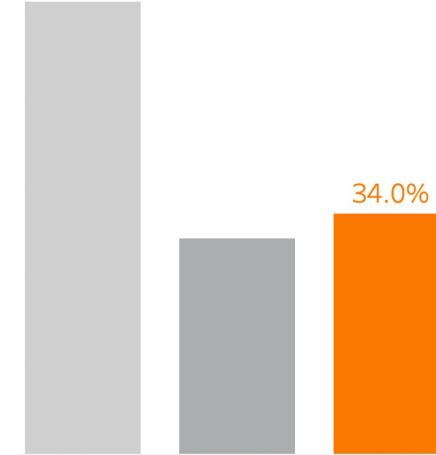
Information & Dictionary Resources



Medium number
of districts



Information & Dictionary Resources



In addition to live in **low multiracial rate** districts, only a small number of students **rely on free/reduced lunch** and the local government are **not willing** to spend a great amount on **educational expenditure**. Nevertheless, they are students who frequently the most **look up information for their studying** actively

Students of **white** not only **participated the most** in SAT exam but also **achieved 17% higher average SAT score** than students of **colors**

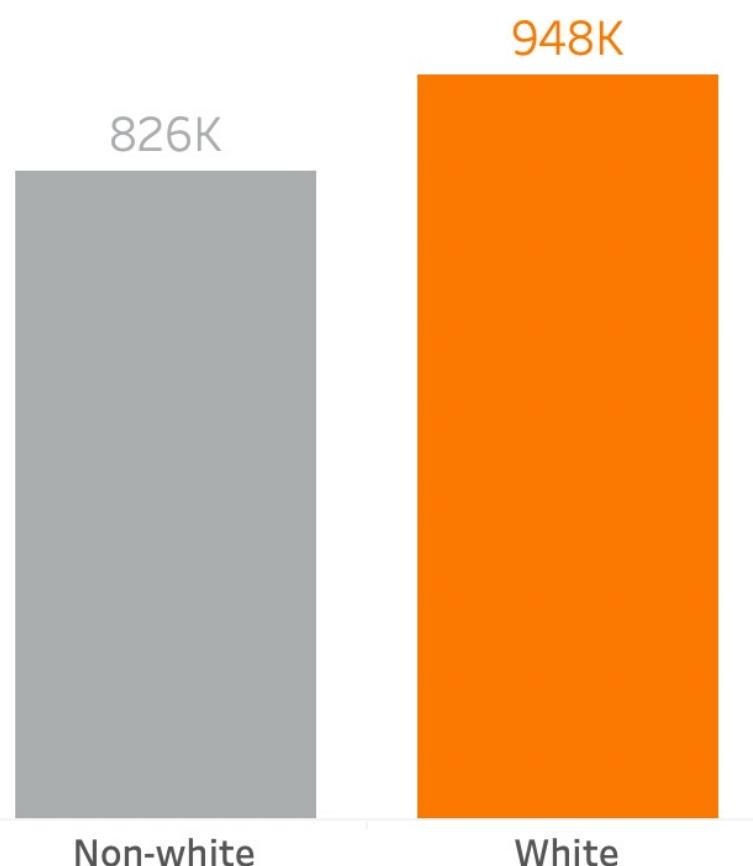


FIGURE 4.2.1 Number of test takers per race

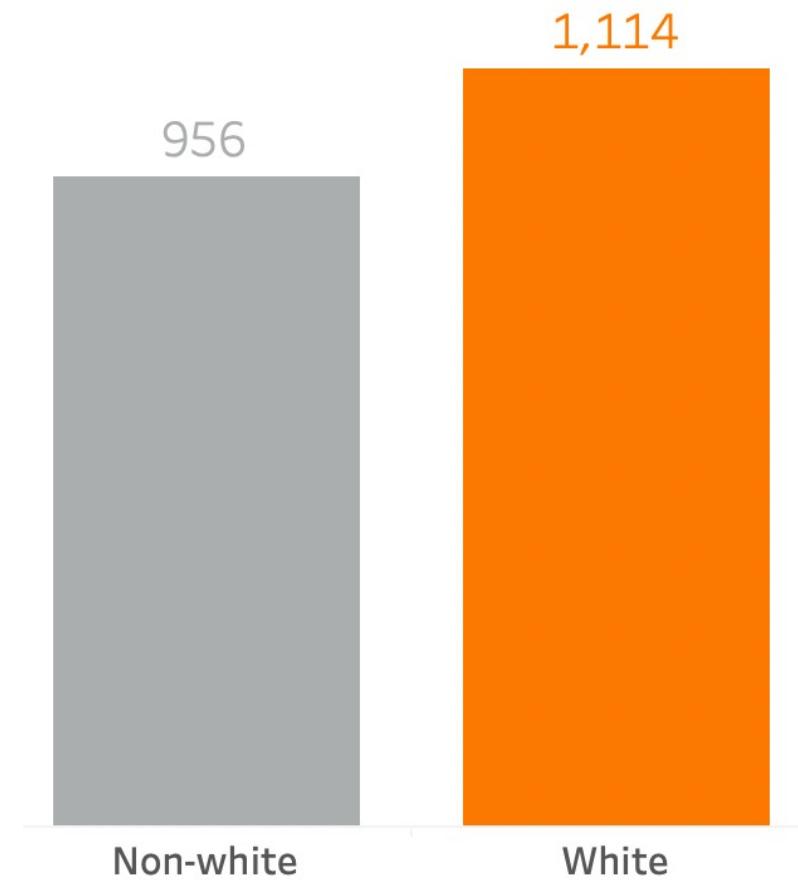


FIGURE 4.2.2 Mean SAT score per race

*Source: National Center for Education Statistics (NCES)

FIGURE 4.2.3
Number of test takers per parental education in 2020 in U.S

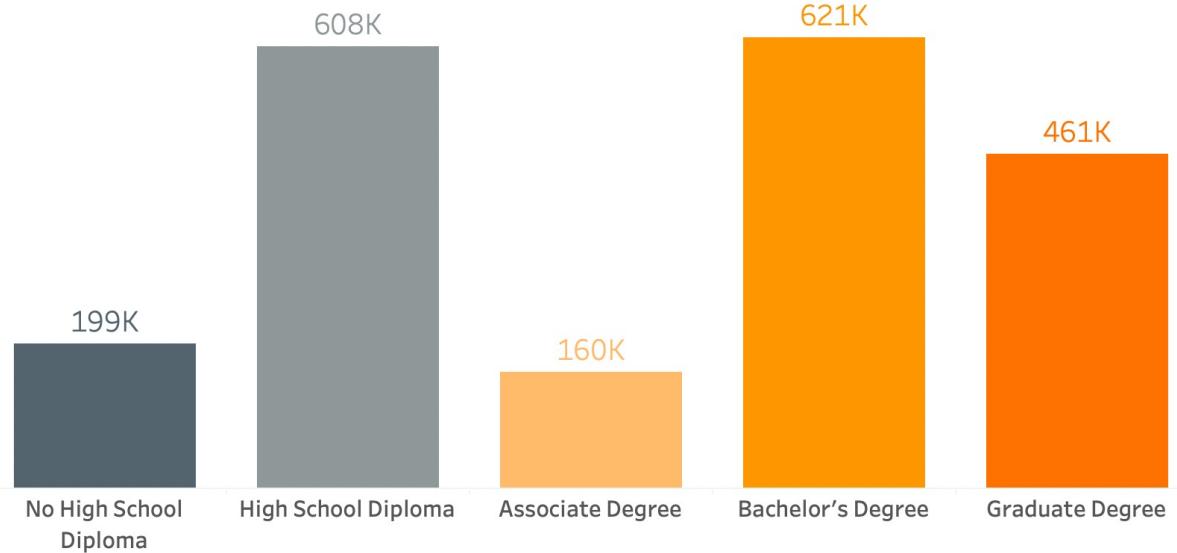
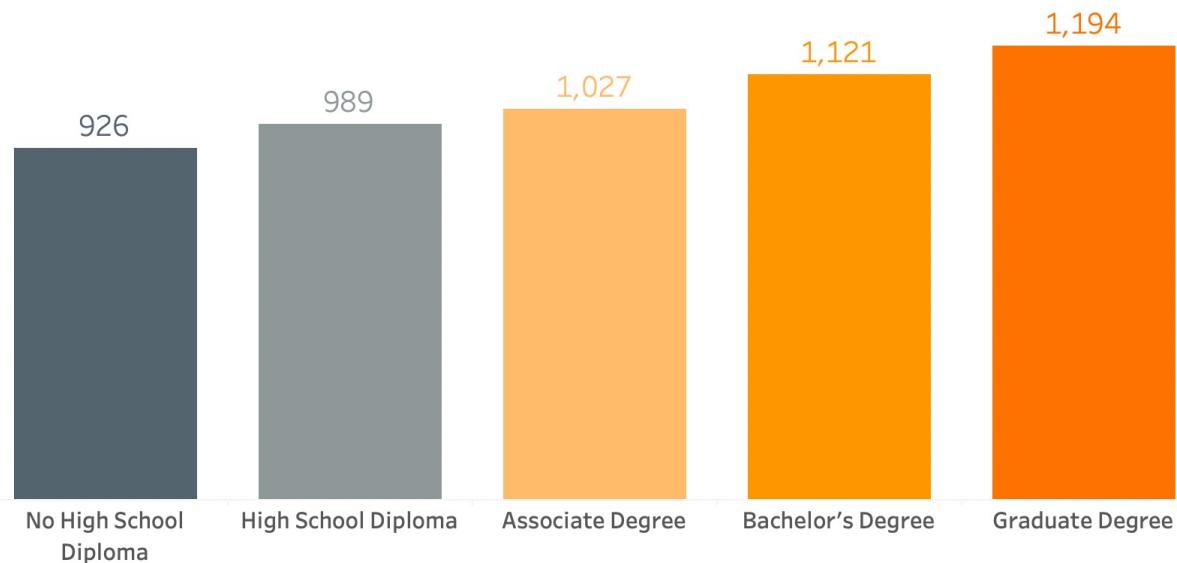


FIGURE 4.2.4
Mean SAT score per parental education in 2020 in U.S



Although the test takers could come from any parental education background, the **highest average SAT score** is still **mostly achievable** by students born in families with parents got an **Associate Degree or above**

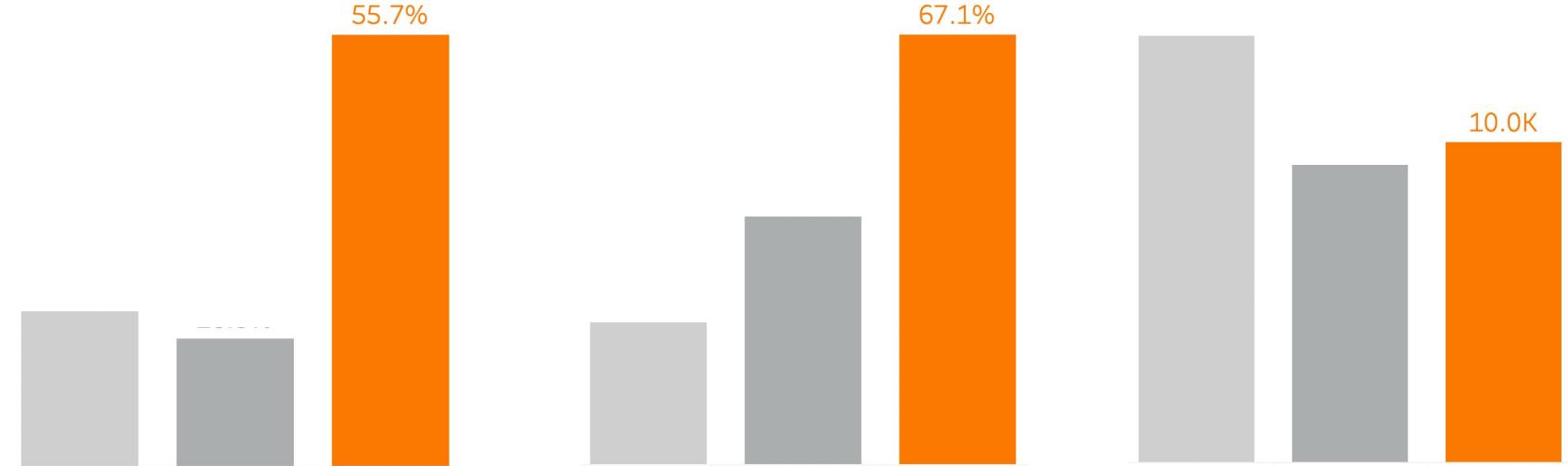
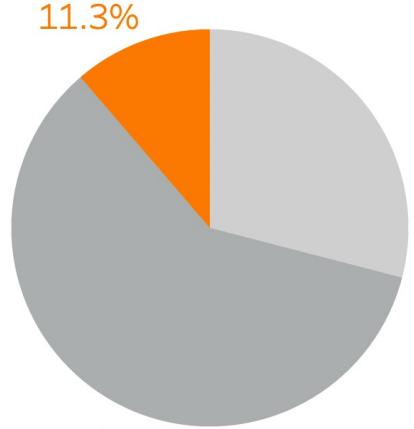


Content Creation & Curation

cluster group



Content Creation & Curation



Lowest number of districts

Highest multiracial rate

Highest rate of unfavorable economic families

Medium district expenditure

Students in districts with **high multiracial rate and not good economic status** express their interests in **content creation and curation** the best while district governments also spend an **average amount of budget** on their local education.

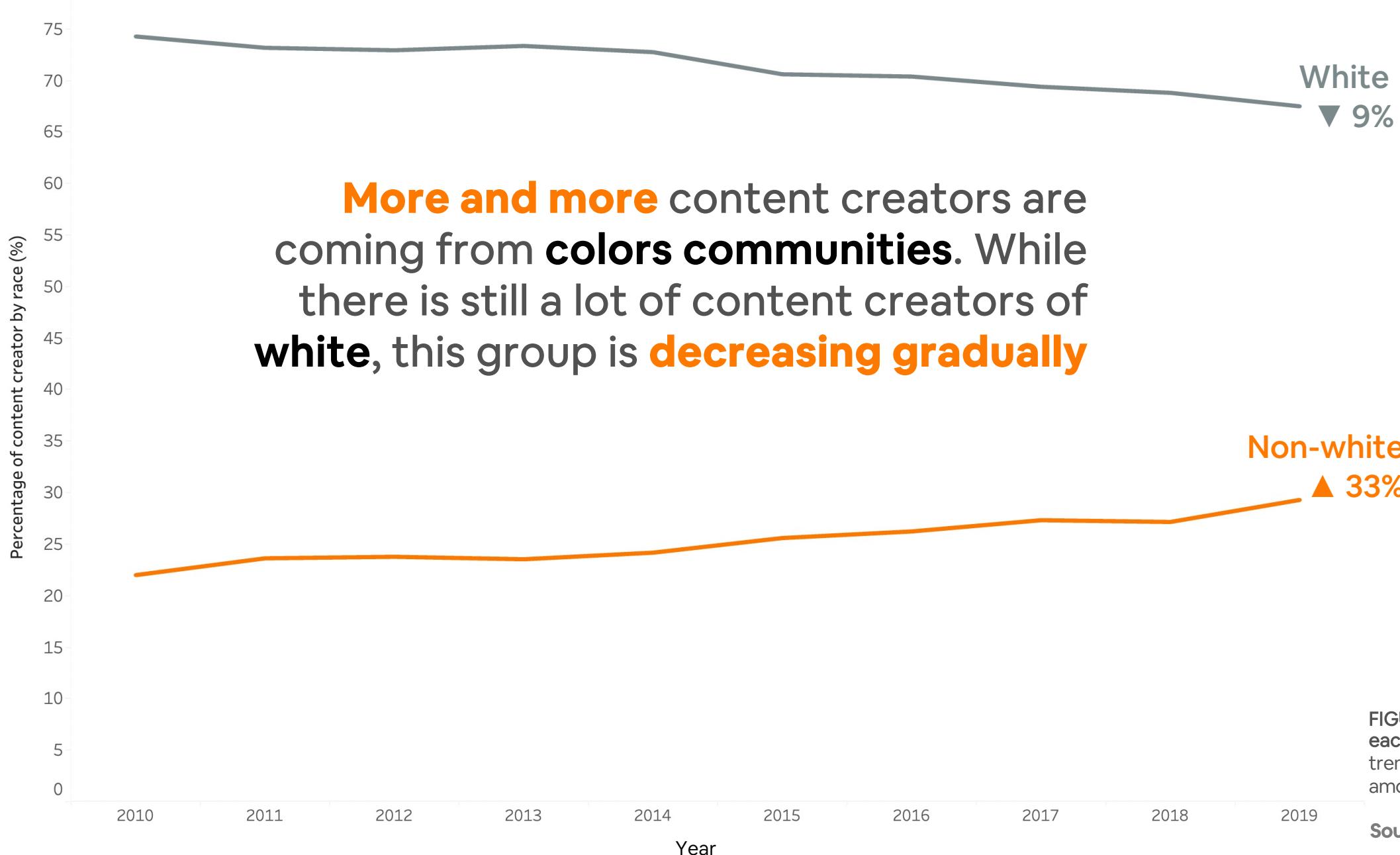


FIGURE 4.3.1 Percentage of each ethnic category trended between 2010-2019 among content creators

Source: U.S. Census Bureau

Recommendation

Low

Medium

High

Career Planning & Job Search



Information & Dictionary Resources



Content Creation & Curation



A dark auditorium with a large audience clapping their hands.

Thanks for your attention!