Investigating High School Graduation Rates

Agenda

1 **Introduction**

2 **Investigation Process**

3 **Results**

3 **Conclusions**

79%
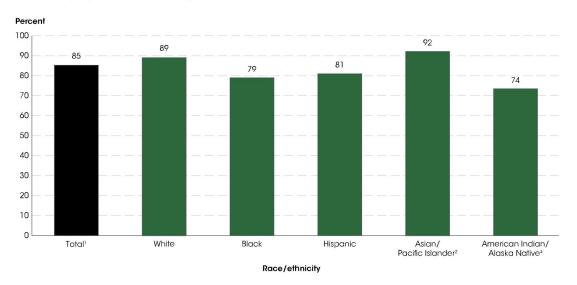Black student graduation rate in the US

470,000
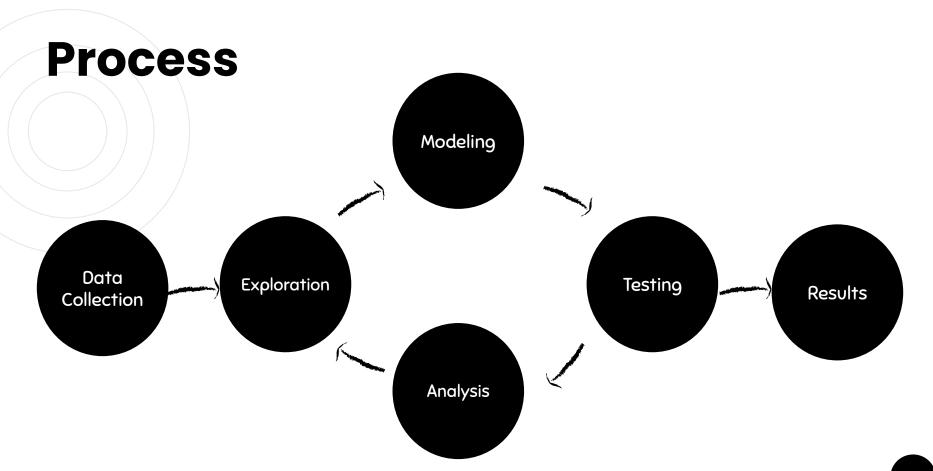Black students not achieving standard high school diplomas

6%
Below national average

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The Achievement Gap

Adjusted cohort graduation rate (ACGR) for public high school students, by race/ethnicity: 2017–18

Percent

	Total[1]	White	Black	Hispanic	Asian/Pacific Islander[2]	American Indian/Alaska Native[3]
	85	89	79	81	92	74

Race/ethnicity

Source: https://nces.ed.gov/programs/coe/indicator_coi.asp

What aspects of a high school are correlated with the lower black graduation rate?

Process

Data Collection → Exploration → Modeling → Analysis → Testing → Results

Data Collection

Non-profit providing school information collected from government education agencies

Primary federal entity for collecting and analyzing data related to education in the U.S

Scraped 54,000 available high school pages using Selenium and Beautiful Soup

Downloaded graduation rates by demographic and state

Data Observations

- Low number of schools actually report black population and graduation rates

  (~25% of US schools)

- Several hundred schools with 100% population of each demographic

Initial Modeling Results

Separate linear regression models with the same 24 features (with exception of target) were able to predict the graduation rate of black students and white students, but not the gap

Target	R^2
Black student graduation rate	**0.6**
White student graduation rate	**0.8**
Achievement gap	**0.1**

Feature Selection

Used lasso to narrow down the list of 24 features

Top 10

Graduation Rate: Overall

Graduation Rate: White

Graduation Rate: Hispanic

Suspension Rate: Black

Chronic **Absence** Rate: White

Chronic **Absence** Rate: Overall

Chronic **Absence** Rate: Black

Population: Black

Suspension Rate: Overall

Population: Hispanic

Other features included:

School type, student population, student/teacher ratio, dual enrollment class rate, AP course enrollment rate, % of teachers with minimum 3 years experience, average teacher salary, counselor/student ratio

Feature Selection

Used lasso to narrow down the list of 24 features

What actually matters

~~**Graduation Rate: Overall**~~

~~**Graduation** Rate: White~~

~~**Graduation** Rate: Hispanic~~

~~**Suspension** Rate: Black~~

~~Chronic **Absence** Rate: White~~

~~Chronic **Absence** Rate: Overall~~

~~Chronic **Absence** Rate: Black~~

~~**Population**: Black~~

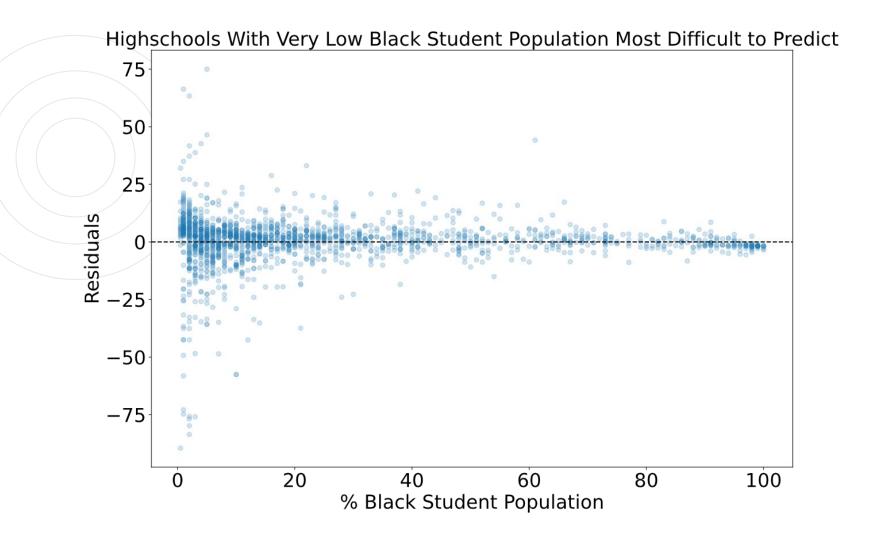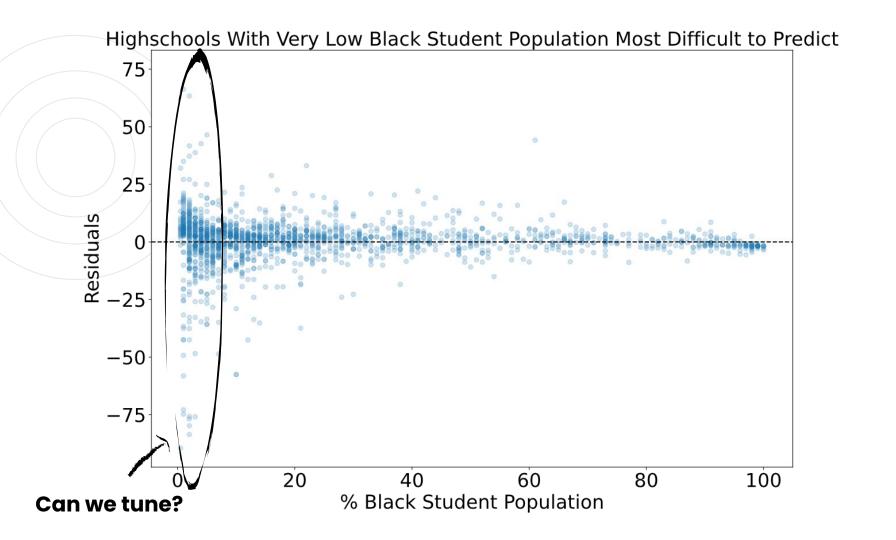~~**Suspension** Rate: Overall~~
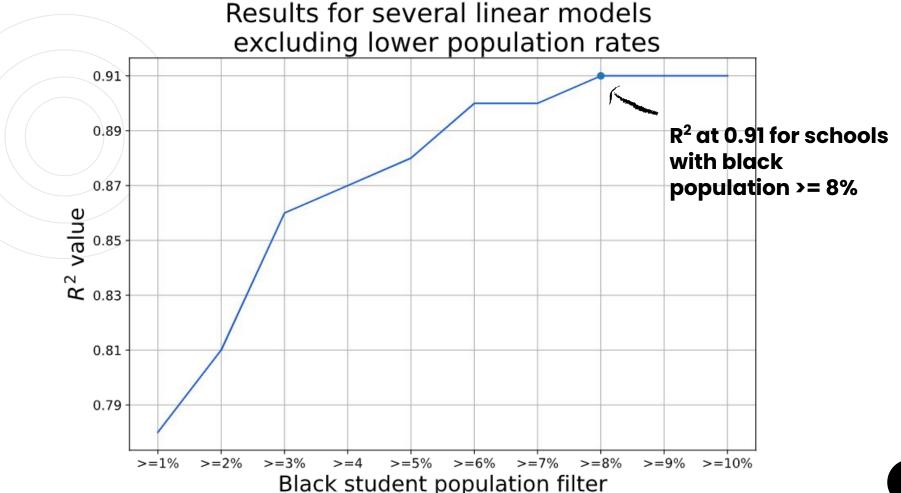
~~**Population**: Hispanic~~

$$R^2 = 0.78$$

Other features included:

School type, student population, student/teacher ratio, dual enrollment class rate, AP course enrollment rate, % of teachers with minimum 3 years experience, average teacher salary, counselor/student ratio

Highschools With Very Low Black Student Population Most Difficult to Predict

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Highschools With Very Low Black Student Population Most Difficult to Predict

Can we tune?

Results for several linear models excluding lower population rates

R^2 at 0.91 for schools with black population >= 8%

x-axis: Black student population filter (>=1%, >=2%, >=3%, >=4, >=5%, >=6%, >=7%, >=8%, >=9%, >=10%)

y-axis: R^2 value (0.79, 0.81, 0.83, 0.85, 0.87, 0.89, 0.91)

Final Modeling Results

Linear models on single feature: Overall graduation rate

Target	Filtered Model	General Model
Black student graduation rate	**0.91 population >= 8%**	**0.47 population < 8%**
White student graduation rate	**0.92 population >= 6%**	**0.21 population < 6%**

- Filtered model refines prediction for a subset
- General model does not predict well for high schools with low population rates of that demographic

Conclusions

- More schools should be reporting granular demographic graduation rate data
- Additional factors outside of school performance influence the predictability of graduation rates
- Students are more likely to perform like their peers where there is a larger population
  - This highlights the need for educators to intentionally support students where the population is low for their demographic
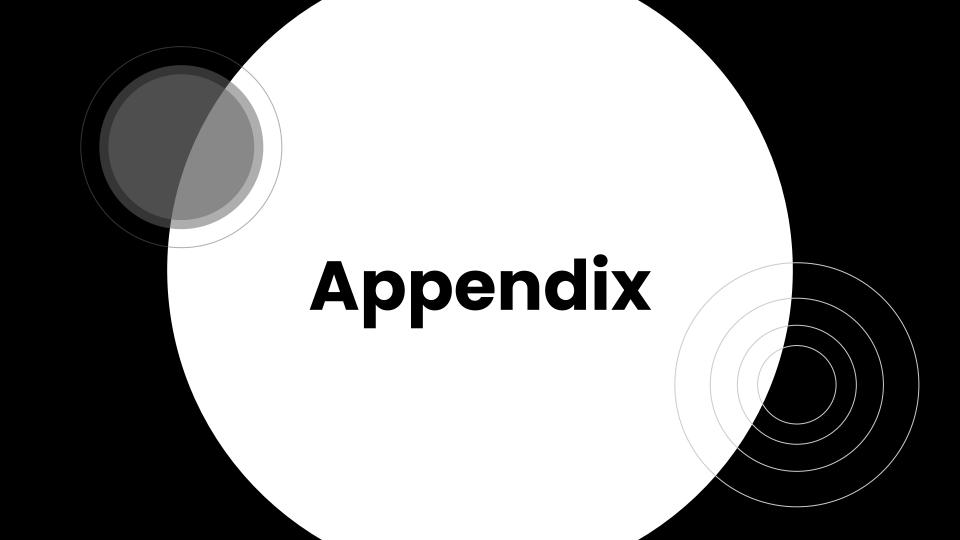
Future Work

- Incorporate state/district socio-economic data to investigate relationships to low income graduates
- Additional research to look into graduation rate variability in the low demographic population schools
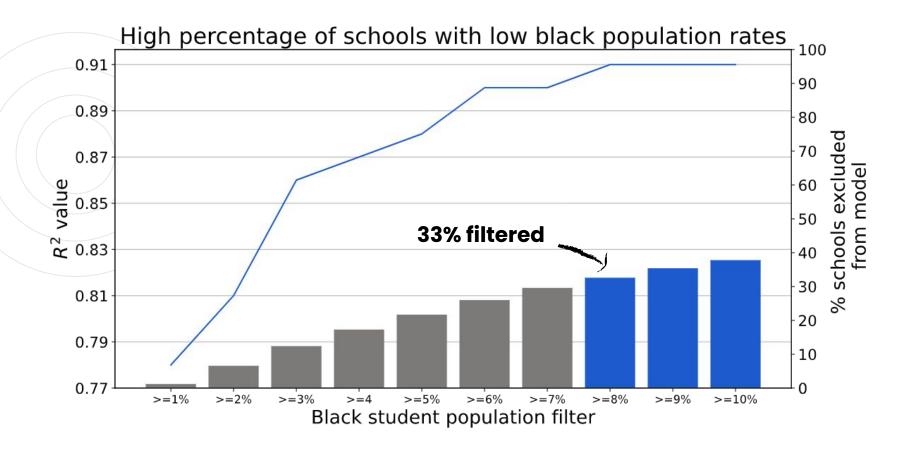
"Racial equality is not just the absence of discrimination but also the presence of values and systems that ensure fairness and justice.

–YWCASPOKANE.ORG

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Thanks!

Any questions?

Appendix

High percentage of schools with low black population rates
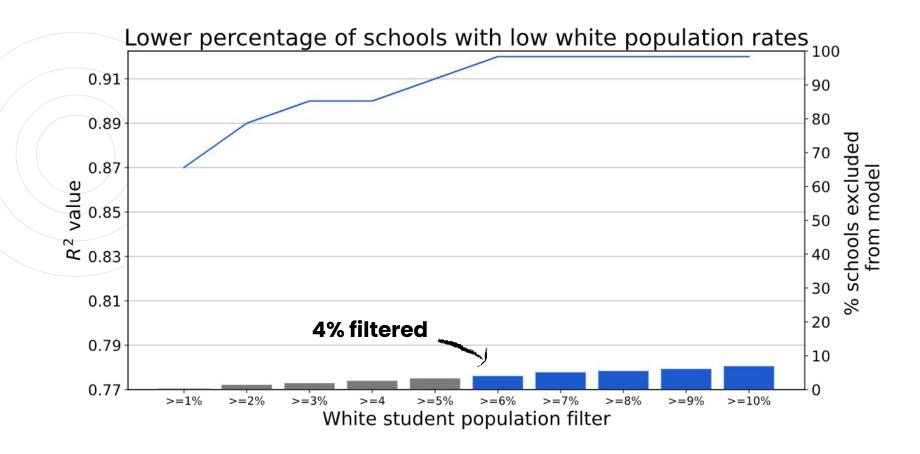
R² = 0.91 for schools >=8% black population

R² = 0.47 for schools <8% black population

Lower percentage of schools with low white population rates

4% filtered

White student population filter

R^2 value / % schools excluded from model
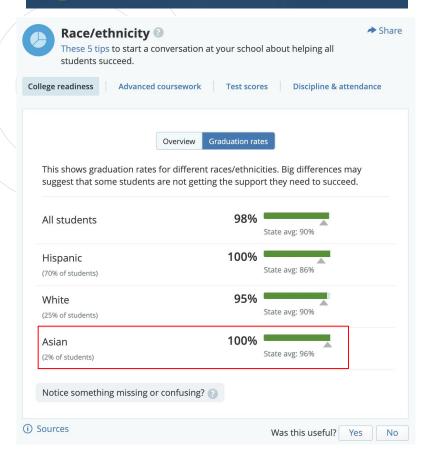
R^2 = 0.92 for schools >=6% white population

R^2 = 0.21 for schools <6% white population

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Observations

- Lower graduation rate predictability in schools with low black student population
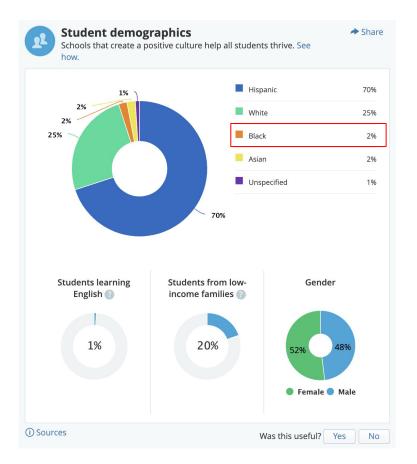- Schools with higher predictability are highly correlated to the overall graduation rate
- High school achievement gap between white and black groups not easily correlated to features in scope
- Lack of data - collected 9,000 of 24,000 high schools in the US with black graduation rate data

Race/ethnicity ⍰

These 5 tips to start a conversation at your school about helping all students succeed.

➡ Share

College readiness | Advanced coursework | Test scores | Discipline & attendance

Overview | **Graduation rates**

This shows graduation rates for different races/ethnicities. Big differences may suggest that some students are not getting the support they need to succeed.

All students **86%**
State avg: 90%

Hispanic **86%**
(88% of students)
State avg: 86%

White **92%**
(7% of students)
State avg: 90%

Notice something missing or confusing? ⍰

ⓘ Sources

Was this useful? Yes | No

Student demographics

Schools that create a positive culture help all students thrive. See how.

➡ Share

■ Hispanic 88%
■ White 7%
■ Black 4%
■ Unspecified 1%

1%
4%
7%
88%

Students learning English ⍰
12%

Students from low-income families ⍰
85%

Gender
43% 57%
● Female ● Male

ⓘ Sources

Was this useful? Yes | No

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