

PROJECT 1

Group 4:

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Problem Statement

The College Board (SAT), in partnership with ACT Inc. wishes to explore if

- Test participation rates
- Household median annual income
- State population
- College enrollment rates

have any relationship with each state's ACT and SAT performance.

We are a team of analysts hired to analyse the provided data, use supporting data from other sources and present our findings to the college boards.

Data

- Provided

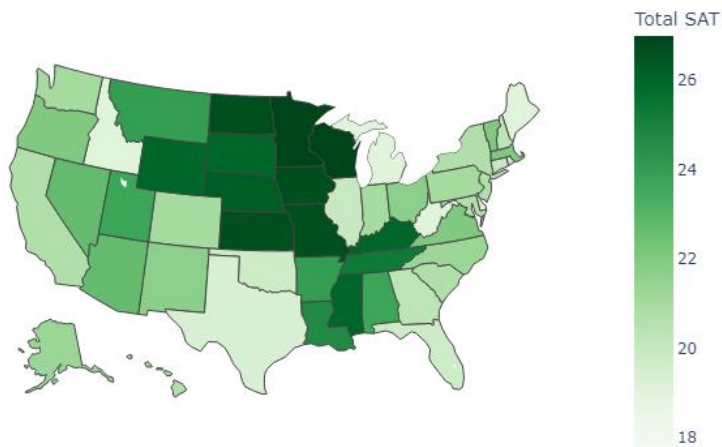
- [act 2017.csv](#)
- [act 2018.csv](#)
- [act 2019.csv](#)
- [sat 2017.csv](#)
- [sat 2018.csv](#)
- [sat 2019.csv](#)

- External

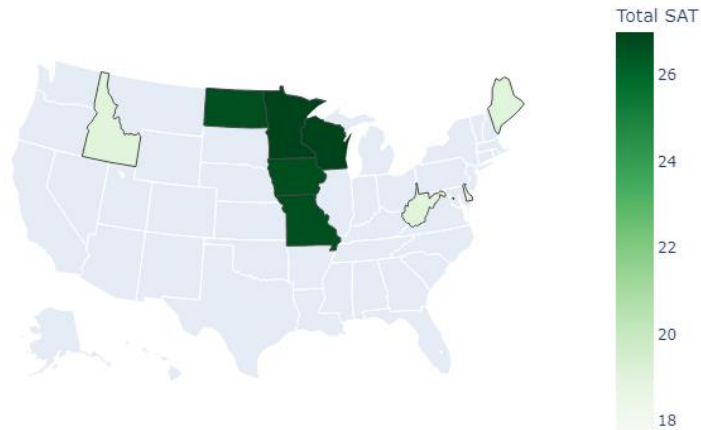
- [Median household income 2017-2019.xlsx](#)
- [Total Resident Population 2010-2019.xlsx](#)
- [2017 enrollment.csv](#)
- [2018 enrollment.csv](#)
- [2019 enrollment.csv](#)
- [ACT 2018 data.xls](#)
- [ACT 2019 data.xls](#)
- [SAT/ACT Concordance Table](#)

Overall Average SAT Scores (2017 to 2019)

States by SAT Total Scores

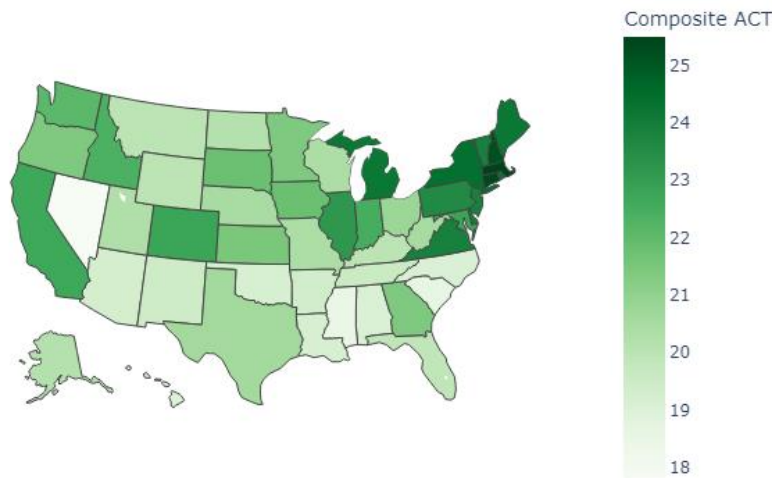


States by SAT Total Scores

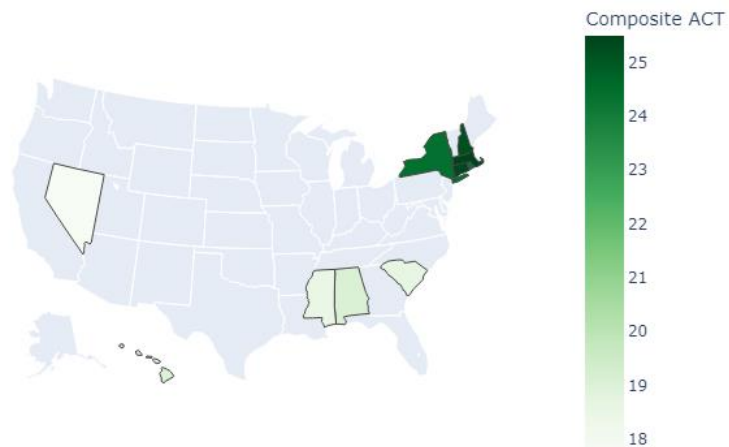


Overall Average ACT Composite Scores (2017 - 2019)

States by ACT Composite Scores



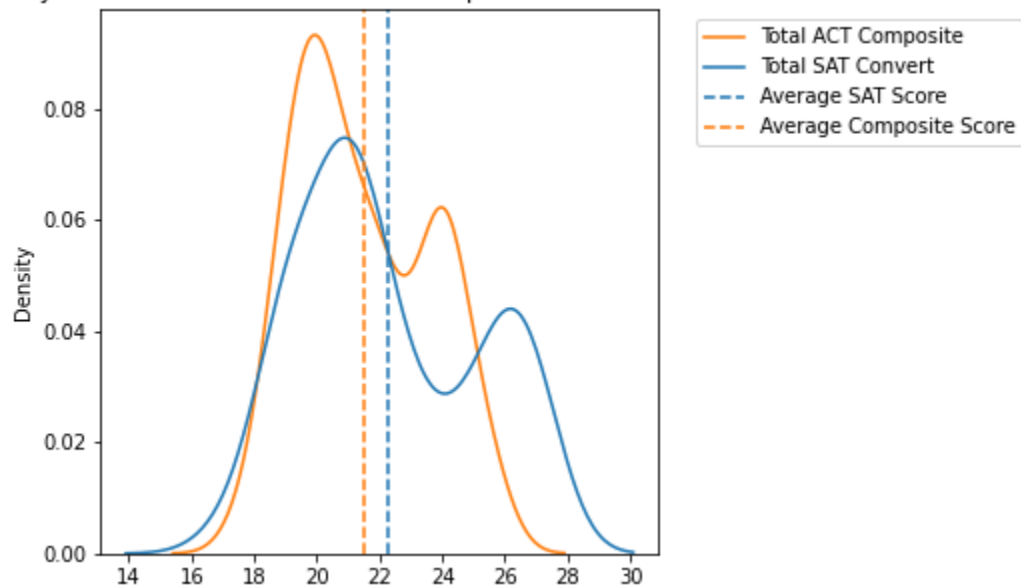
States by ACT Composite Scores



Overall - SAT vs ACT Trend (2017 - 2019)

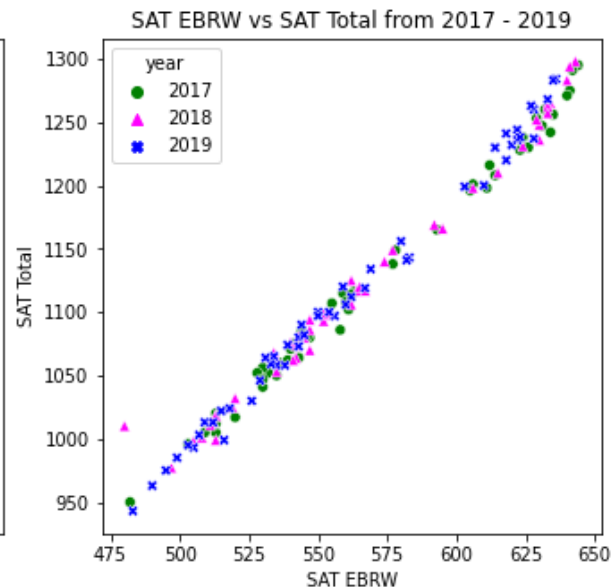
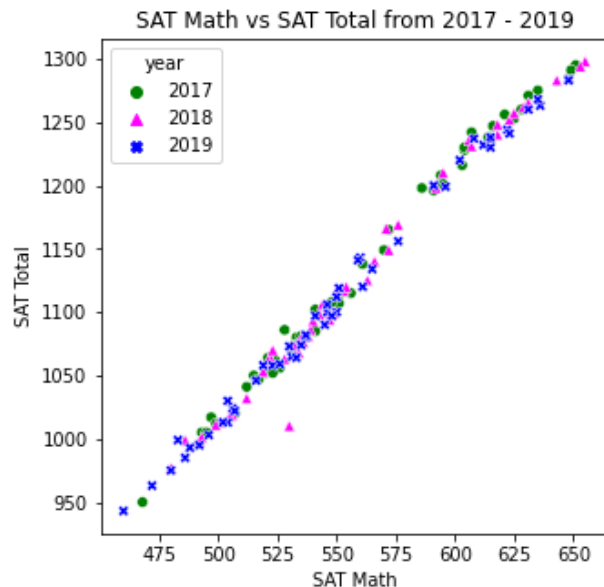
- Similar distribution trend
- Higher SAT scores

Density Distribution of Total SAT and Composite ACT from 2017-2019



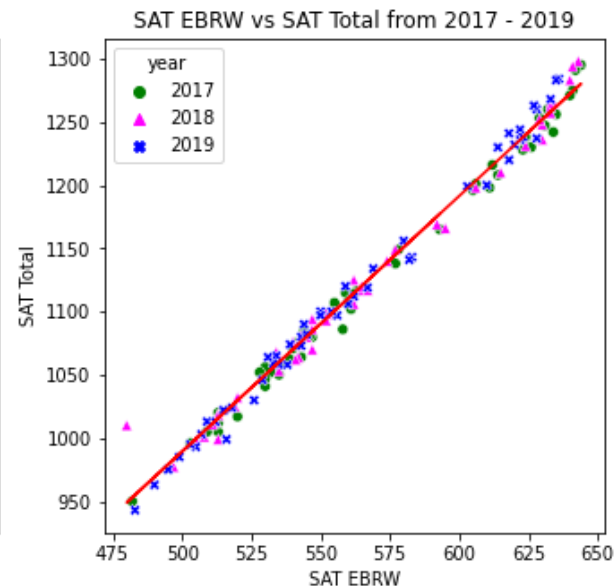
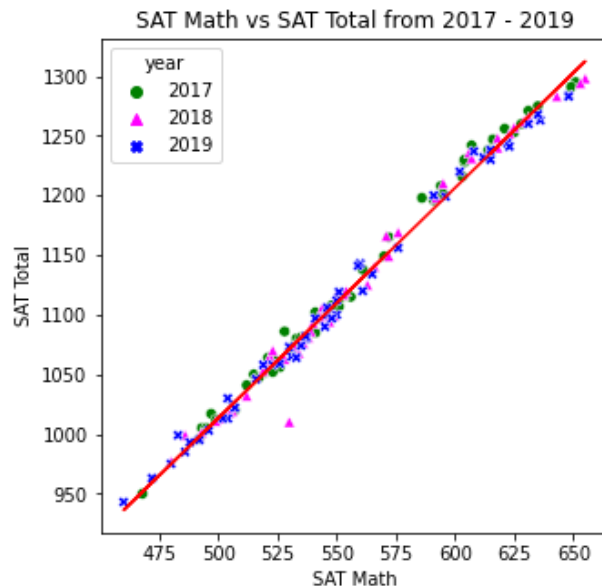
SAT Scores (2017 - 2019)

- Linear relationship observed
- High score in a subject
→ High score overall



SAT Scores (2017 - 2019)

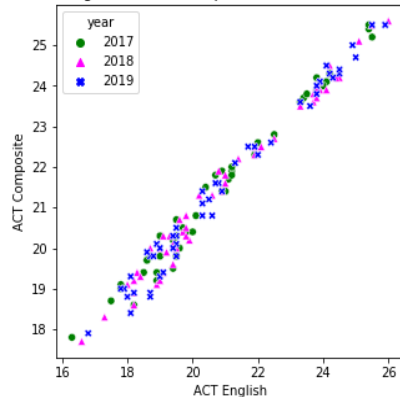
- Linear relationship observed
- High score in a subject
→ High score overall



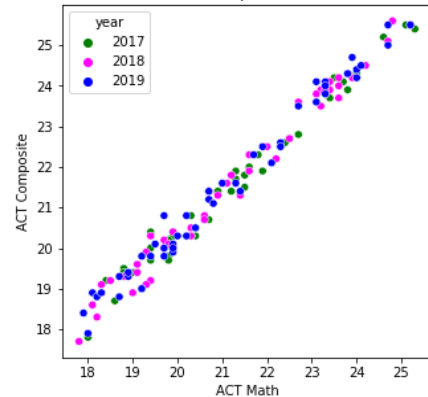
ACT Scores (2017 - 2019)

- Linear relationship observed
- High score in a subject → High score overall

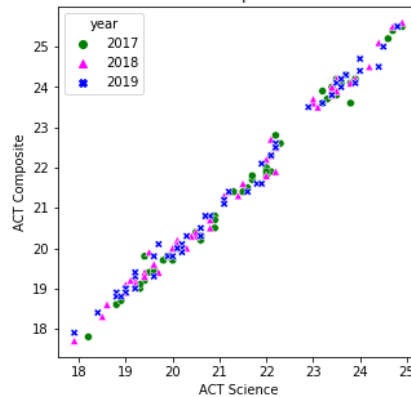
ACT English vs ACT Composite ACT from 2017 - 2019



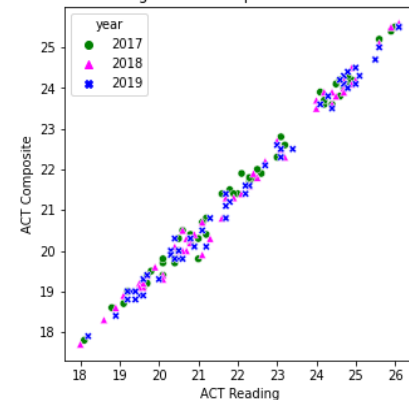
ACT Math vs ACT Composite from 2017 - 2019



ACT Science vs ACT Composite from 2017 - 2019



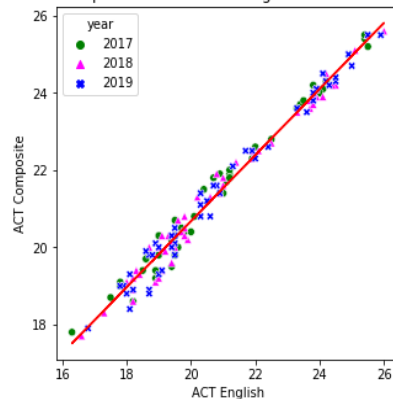
ACT Reading vs ACT Composite from 2017 - 2019



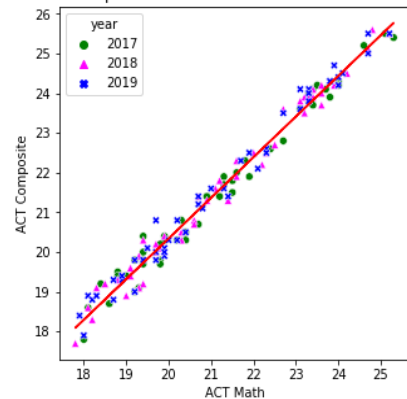
ACT Scores (2017 - 2019)

- Linear relationship observed
- High score in a subject
→ High score overall

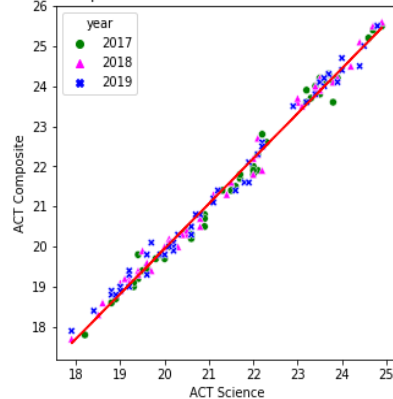
ACT Composite Score vs ACT English from 2017 - 2019



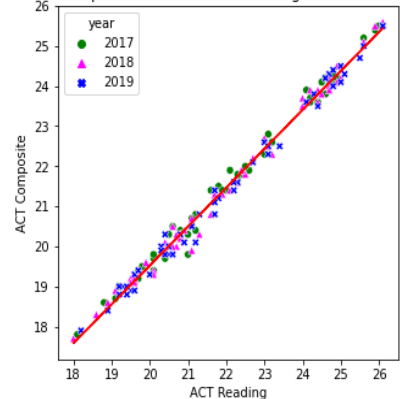
ACT Composite Score vs ACT Math from 2017 - 2019



ACT Composite Score vs ACT Science from 2017 - 2019

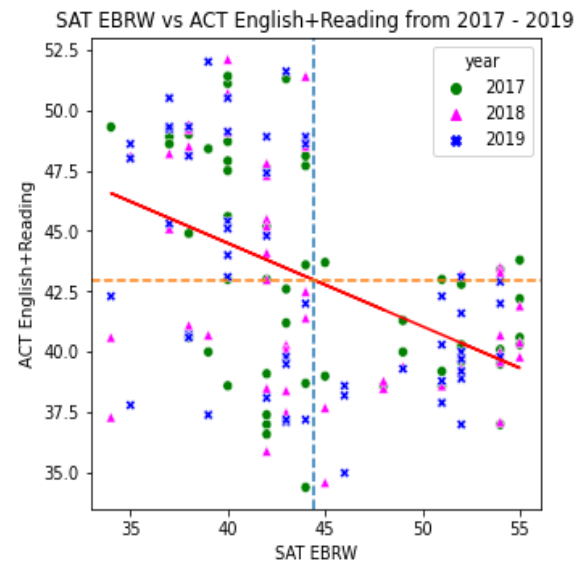
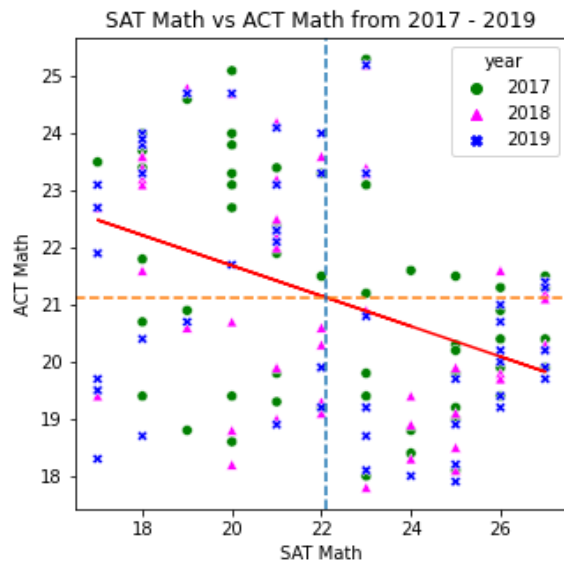


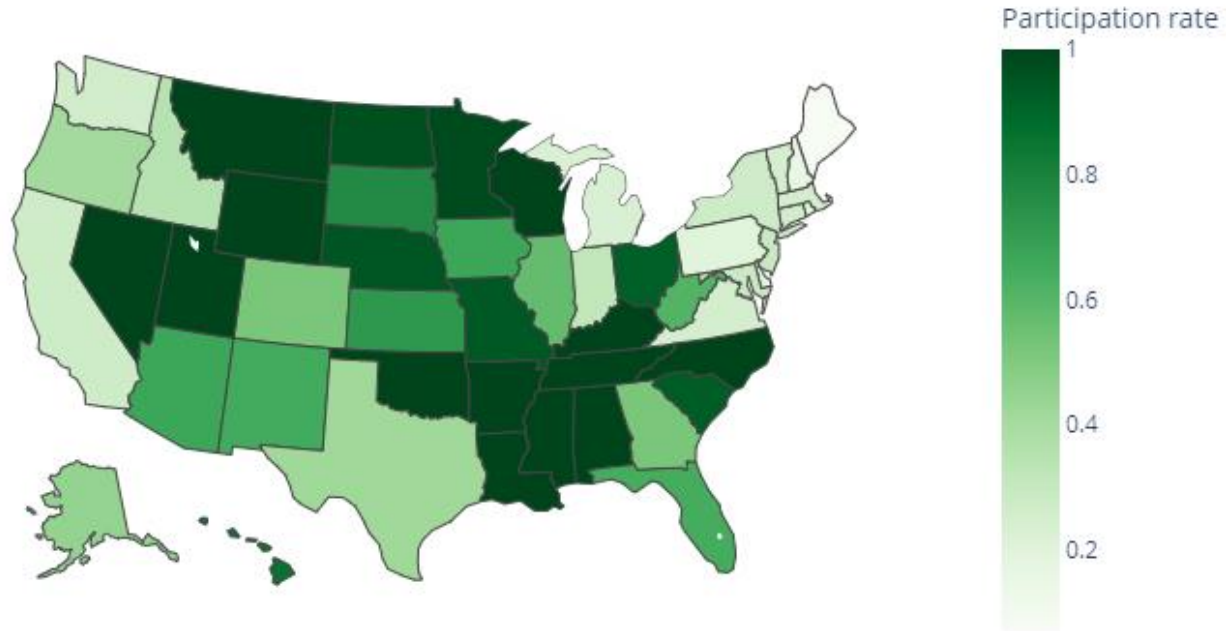
ACT Composite Score vs ACT Reading from 2017 - 2019



SAT vs ACT (2017 - 2019)

- No association seen
- Data is too sparse out

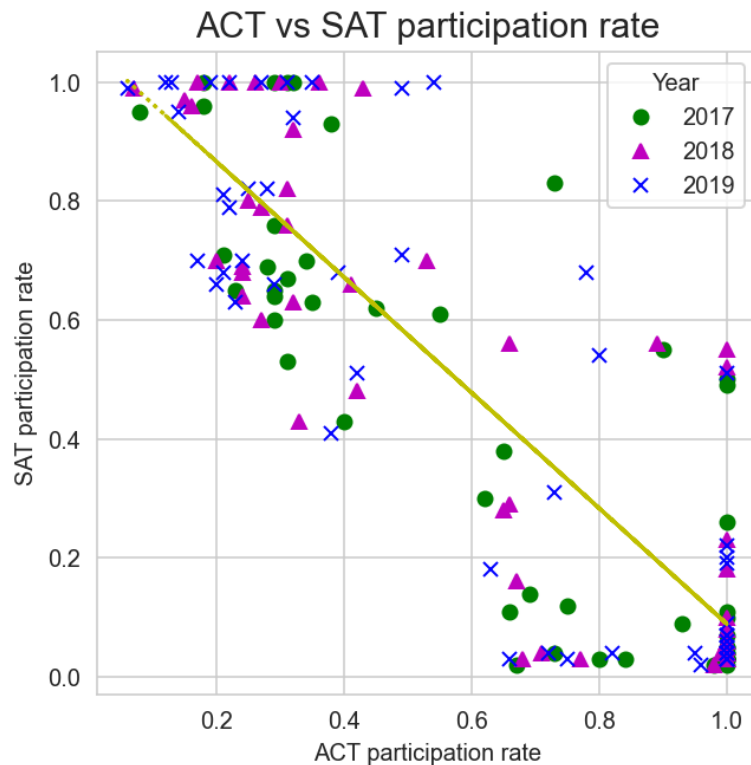




Does a state's ACT/SAT participation rates have any association with her ACT/SAT performance?

Does each state's participation rates have an association with her ACT/SAT performance?

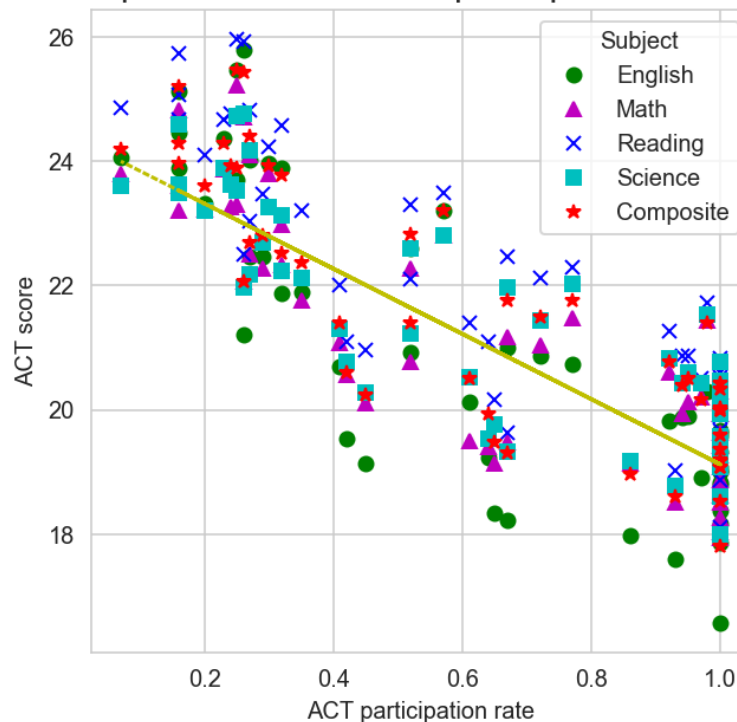
- **Negative** correlation between SAT and ACT participation rates



Does each state's participation rates have an association with her ACT/SAT performance?

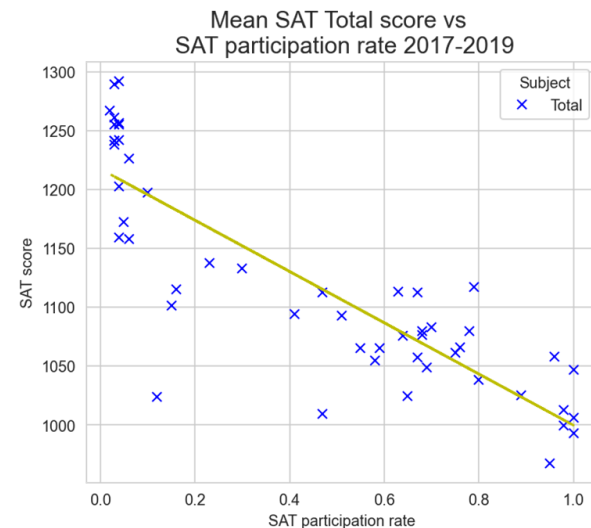
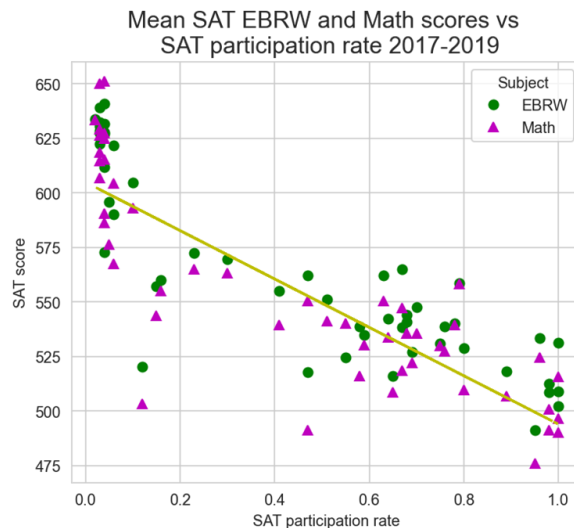
- **Negative** correlation between ACT performance and ACT participation rates

Mean ACT performance vs ACT participation rate 2017-2019



Does each state's participation rates have an association with her ACT/SAT performance?

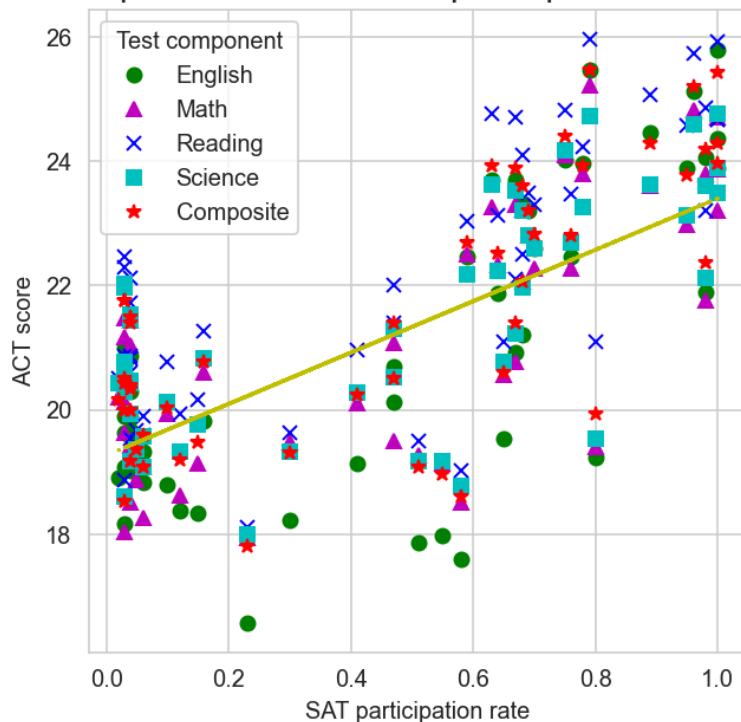
- **Negative** correlation between SAT performance and SAT participation rates



Does each state's participation rates have an association with her ACT/SAT performance?

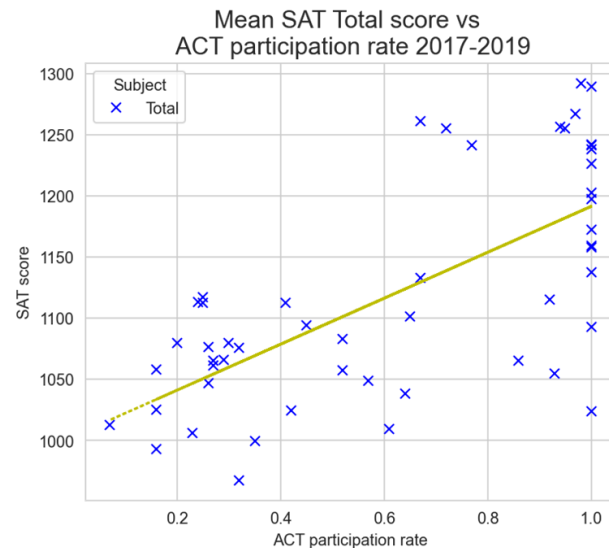
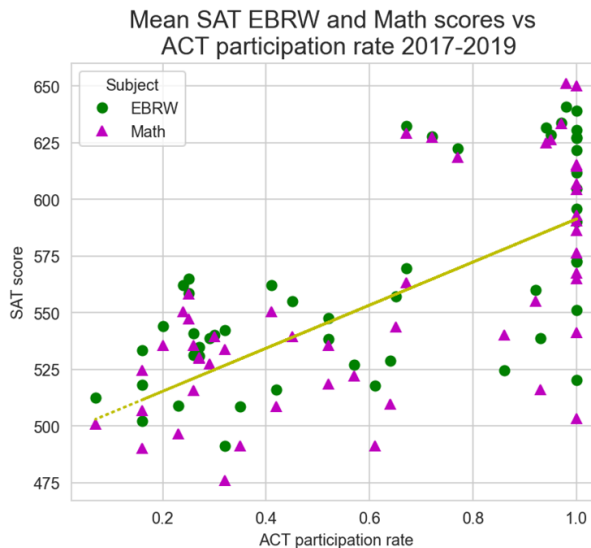
- **Positive** correlation between ACT performance and SAT participation rates

Mean ACT performance vs SAT participation rate 2017-2019

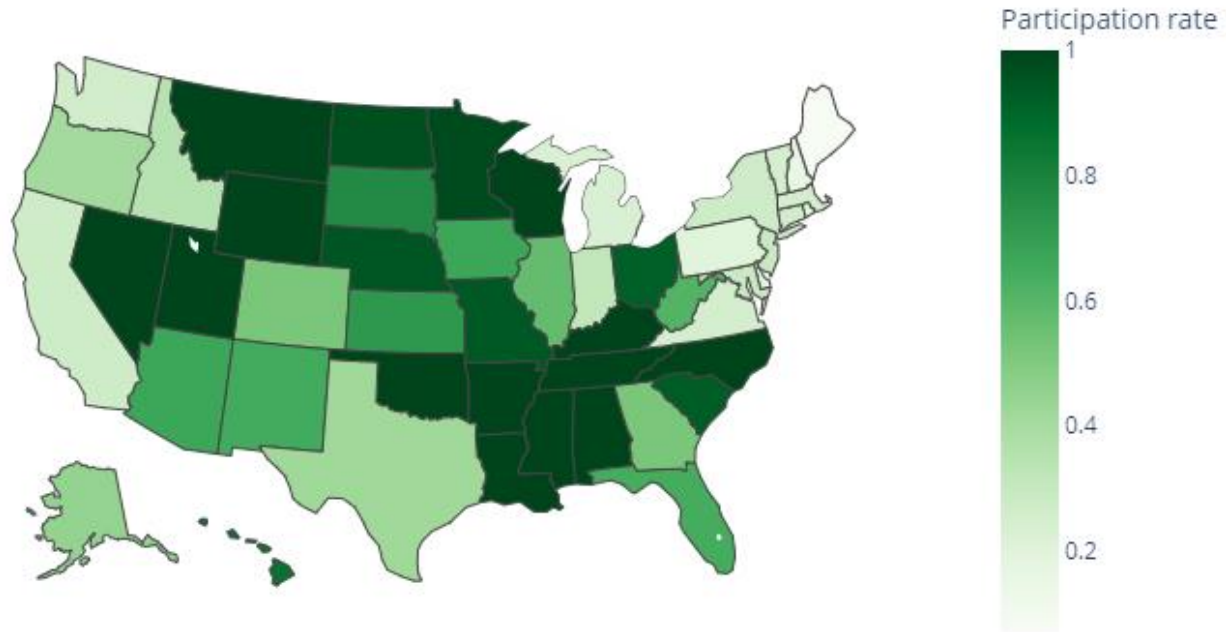


Does each state's participation rates have an association with her ACT/SAT performance?

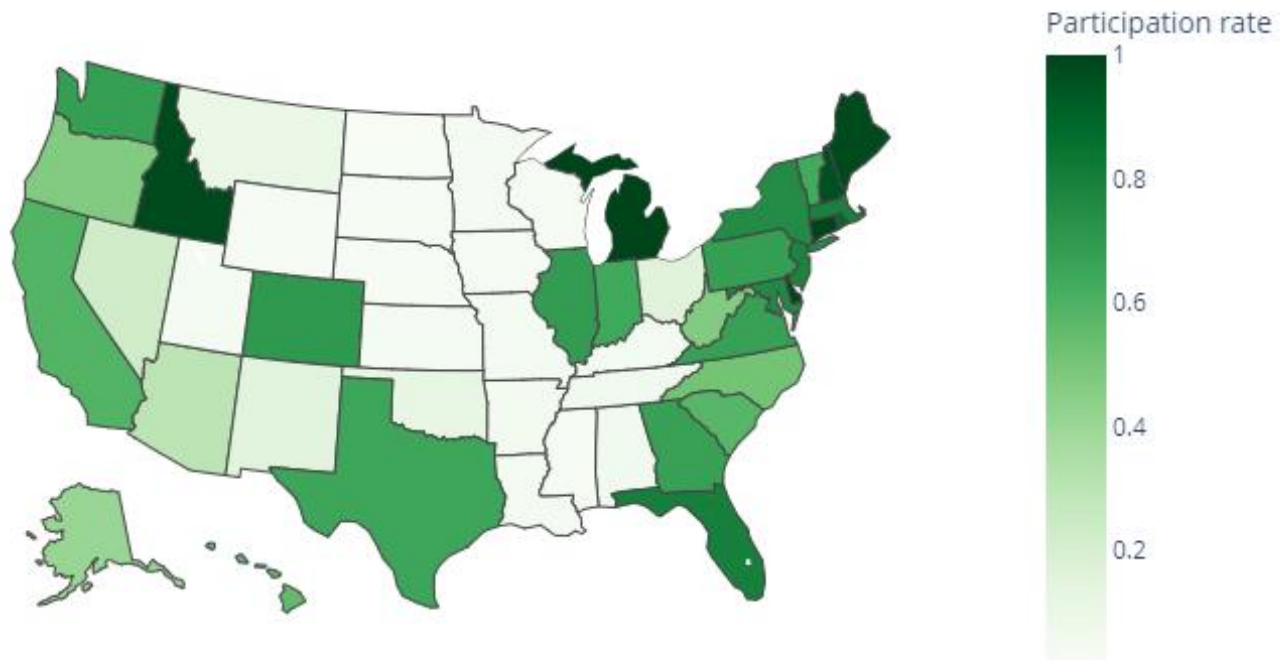
- **Positive** correlation between SAT performance and ACT participation rates



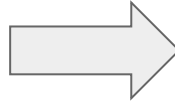
ACT mean participation rate by State



SAT mean participation rate by state

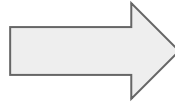


Population

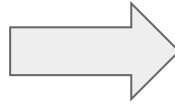


**Participation
Rates**

**Household
Median Income**

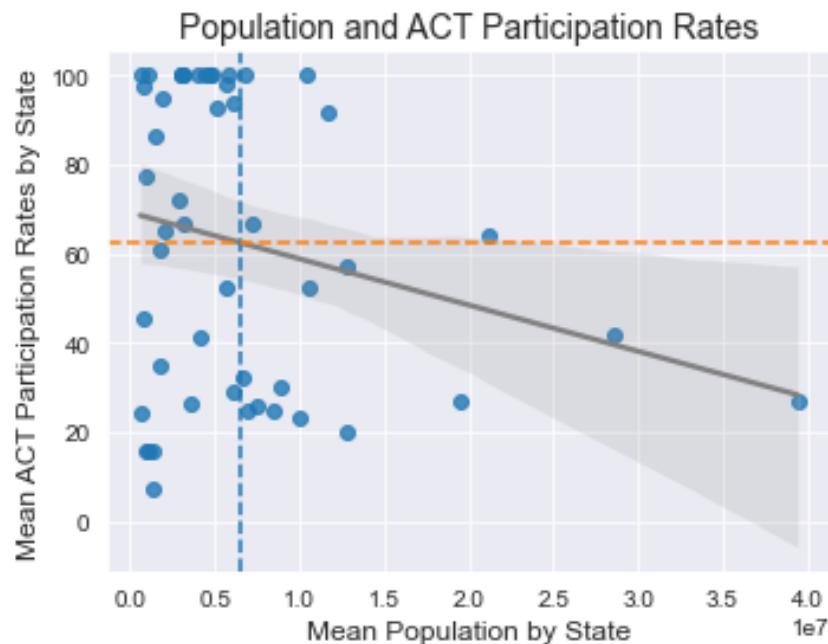
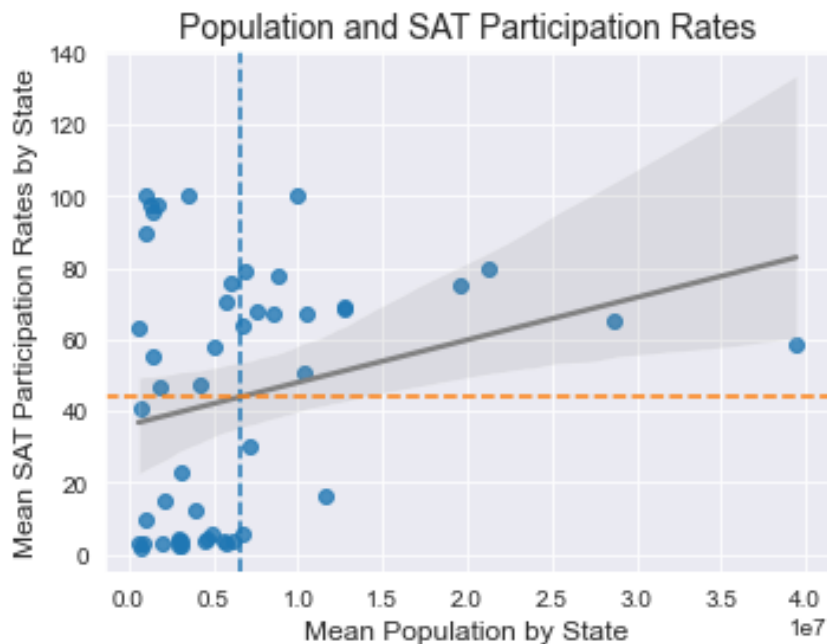


SAT Scores

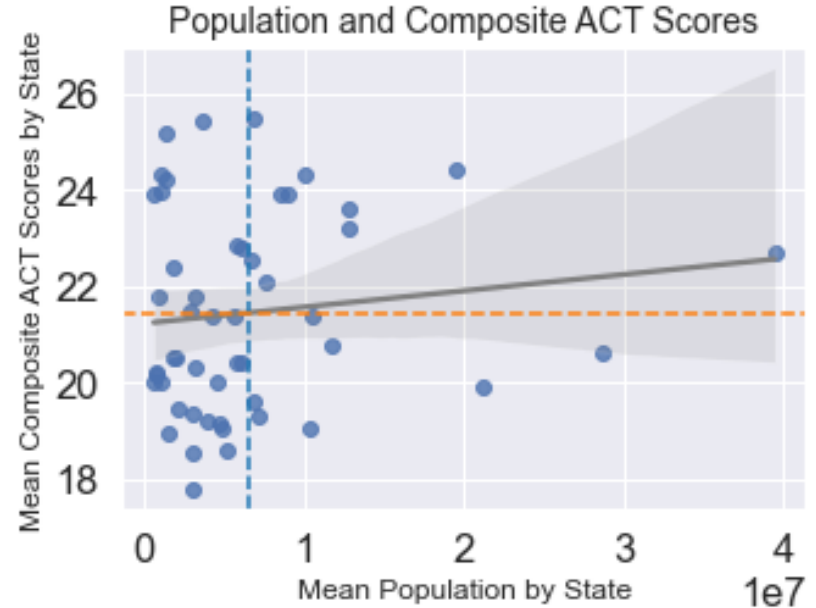
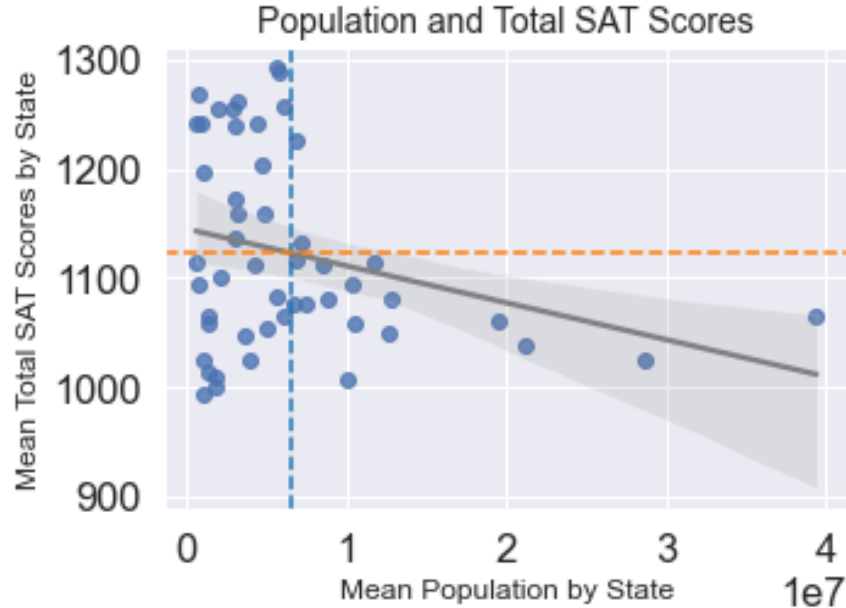


ACT Scores

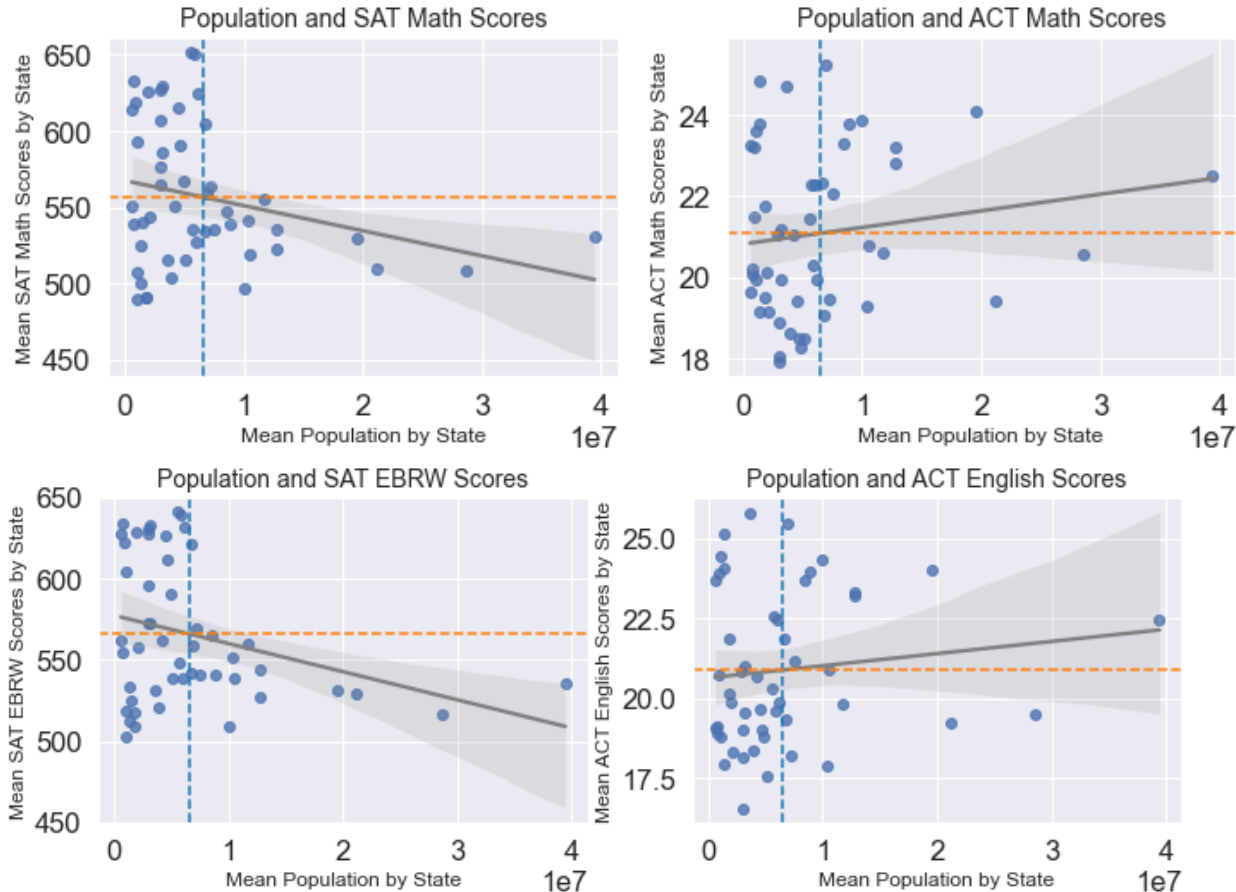
Population and SAT/ACT Participation Rates



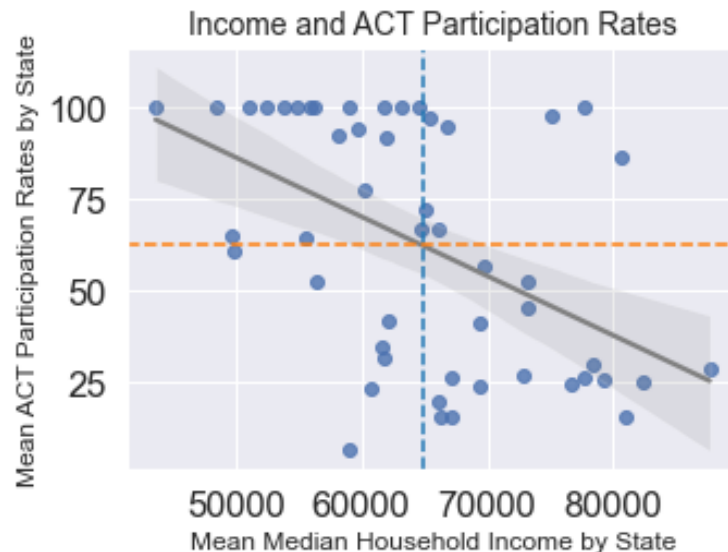
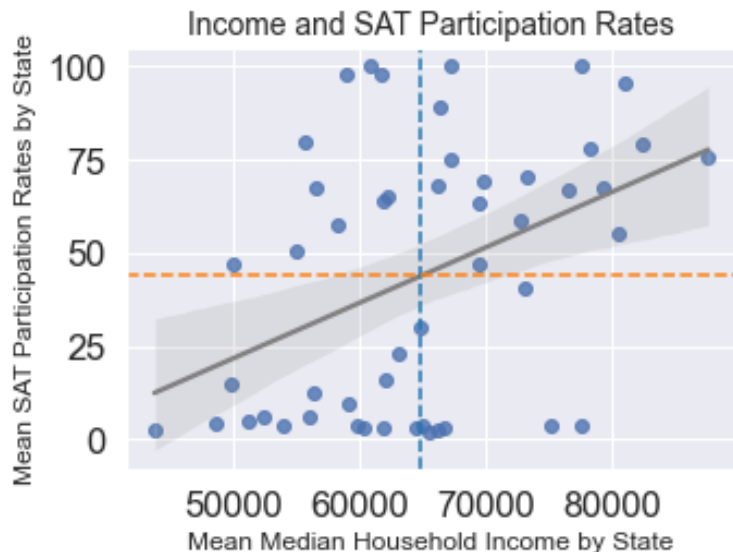
Population and SAT/ACT - Total/Composite Scores



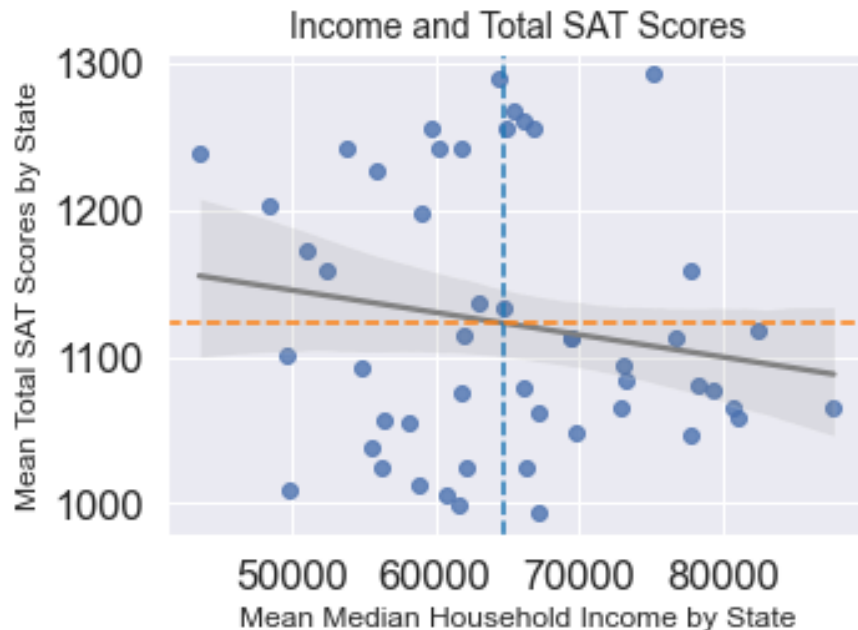
Population and SAT/ACT Scores - Math/EBRW/English



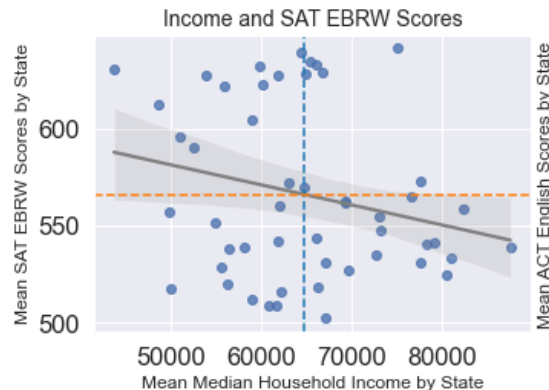
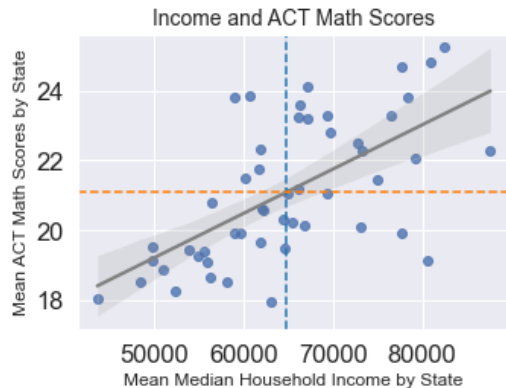
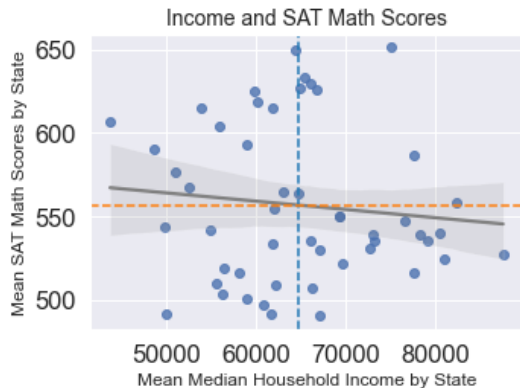
Median Household Income and SAT/ACT Participation Rates



Median Household Income and SAT/ACT - Total/Composite Scores



Median Household Income and SAT/ACT Scores - Math/EBRW/English



Income and Population Analysis

1. Larger Populations have higher participation rates in the SAT but not ACT
2. Larger Populations have higher lower scores in the SAT but higher in ACT
3. Larger Income States have higher participation rates in the SAT but not ACT
4. Larger Income States have higher lower scores in the SAT but higher in ACT

	SAT Participation	ACT Composite Score	ACT Math Score	ACT English Score	ACT Participation	SAT Total Score	SAT Math Score	SAT EBRW Score
Population Increase	↑	↑	↑	↑	↓	↓	↓	↓
Household Median Income Increase	↑	↑	↑	↑	↓	↓	↓	↓

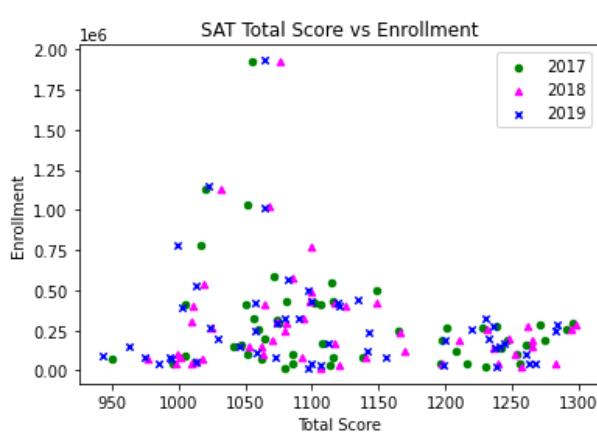
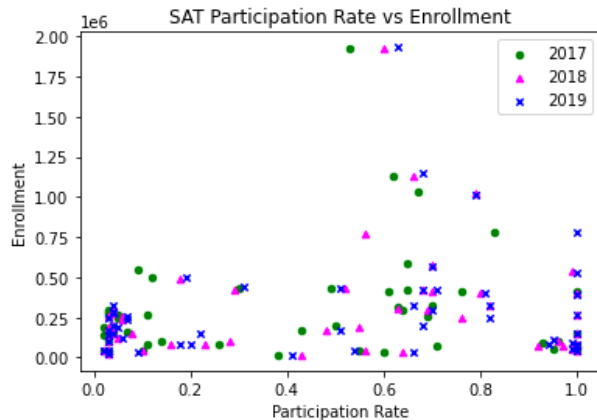
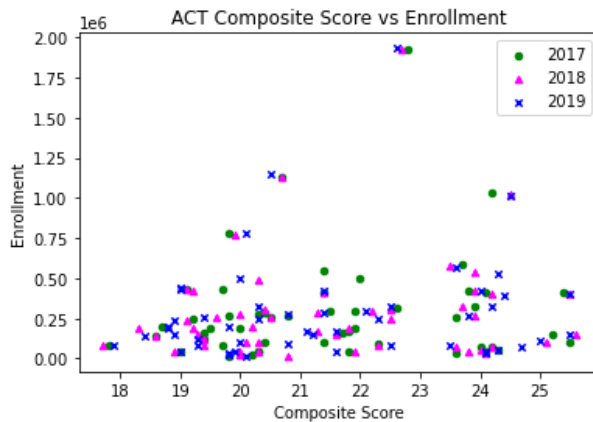
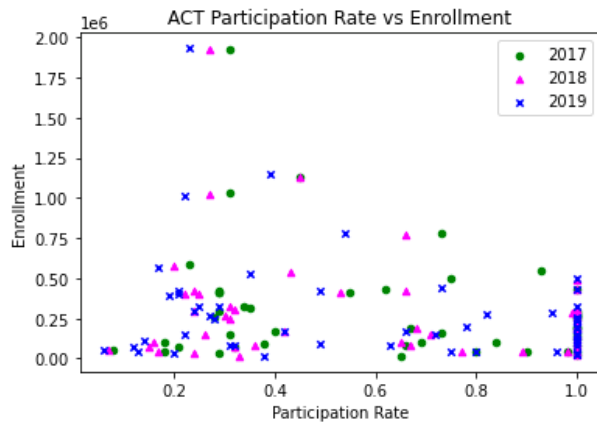
Analysis Limitations for Income and Population

- Only used 3 years worth of data
- Only used participation percentage rates (absolute participation numbers more useful)
- Some findings at odds with what we would expect;
 - (Exp. Higher Income states have lower SAT scores)

Recommendations for Income and Population Analysis

- Take a longer timeframe than 3 years (at least a decade)
- SAT and ACT tests should be free of charge (clearer picture on how population and median household income affects performance)
- More states encourage or make mandatory participation

Does college enrollment rates have an association with each state's ACT/SAT performance?



Conclusions

- Low SAT/ACT scores → High SAT/ACT participation rates
- High SAT participation rate → Low ACT participation rate
- Low SAT participation rate → High ACT participation rate
- High Income/Big Population → High SAT participation, low ACT participation
- High Income/Big Population → Low SAT performance, high ACT performance
- No relationship

Recommendations

1. More data required from:
 - a. Years (ex. 2011 to 2021) for a better certainty on trends and association
 - b. Different government/state education policies
 - c. High school funds and expenditure
2. More research on factors affecting:
 - a. States with high SAT/ACT scores tend to be next to each other
 - b. Low ACT scores from low income households
 - c. States with high SAT scores with low SAT participation rates
 - d. Relationship between household income and SAT scores
 - e. Enrollment rates may be affected universities that opt out of ACT/SAT exams

References

- [United States Census Bureau \(Household median income\)](#)
- [National Center for Education Statistics \(2019 enrollment\)](#)
- [National Center for Education Statistics \(2018 enrollment\)](#)
- [National Center for Education Statistics \(2017 enrollment\)](#)
- [National Center for Education Statistics \(ACT 2018\)](#)
- [National Center for Education Statistics \(ACT 2019\)](#)
- [United States Census Bureau \(US population\)](#)
- [SAT vs ACT Concordance Table](#)
- [National Center for Education Statistics \(US population\)](#)

