Project 1

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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

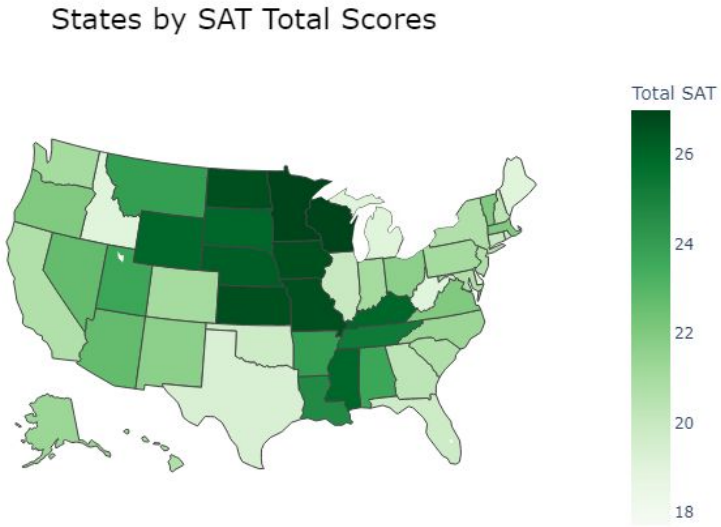
have any relationship with each state's ACT and SAT performance.

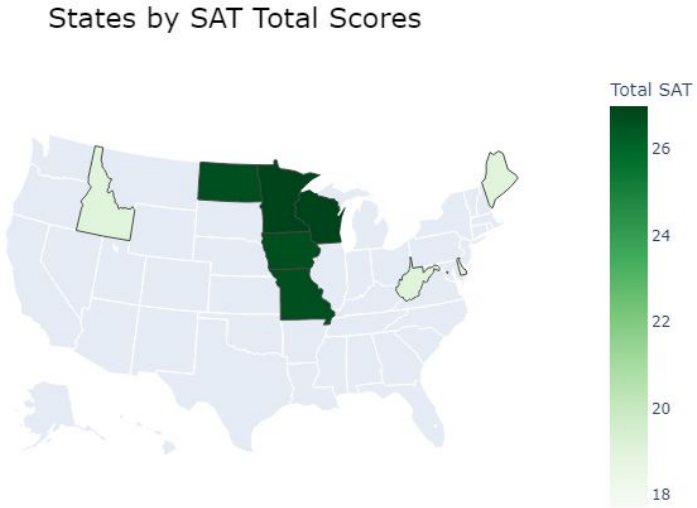
We are a team of analysts hired to analyse the provided data, use supporting data from other sources and present our findings to the college boards.

Data

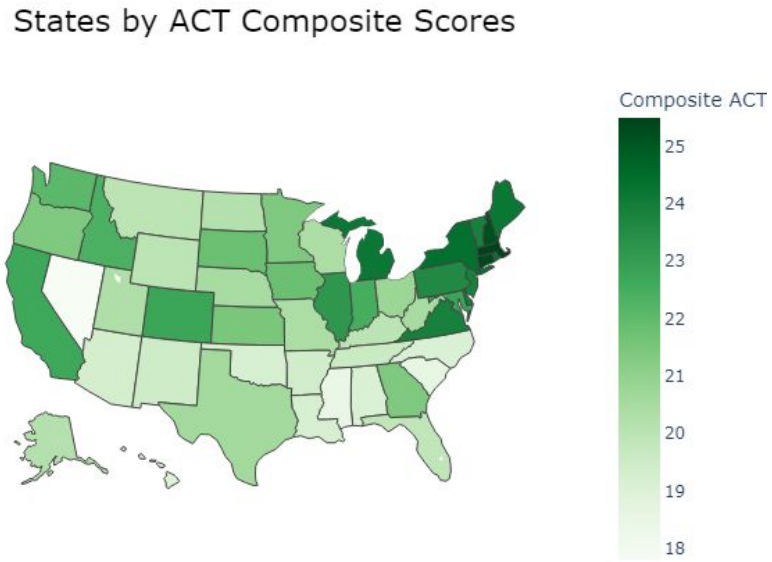
- Provided
  - act_2017.csv
  - act_2018.csv
  - act_2019.csv
  - sat_2017.csv
  - sat_2018.csv
  - sat_2019.csv
- External
  - Median household income 2017-2019.xlsx
  - Total Resident Population 2010-2019.xlsx
  - 2017_enrollment.csv
  - 2018_enrollment.csv
  - 2019_enrollment.csv
  - ACT_2018_data.xls
  - ACT_2019_data.xls
  - SAT/ACT Concordance Table

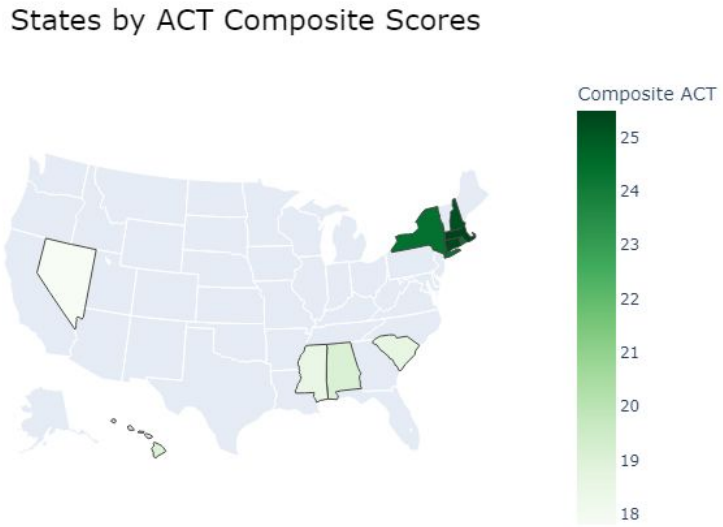
Overall Average SAT Scores (2017 to 2019)





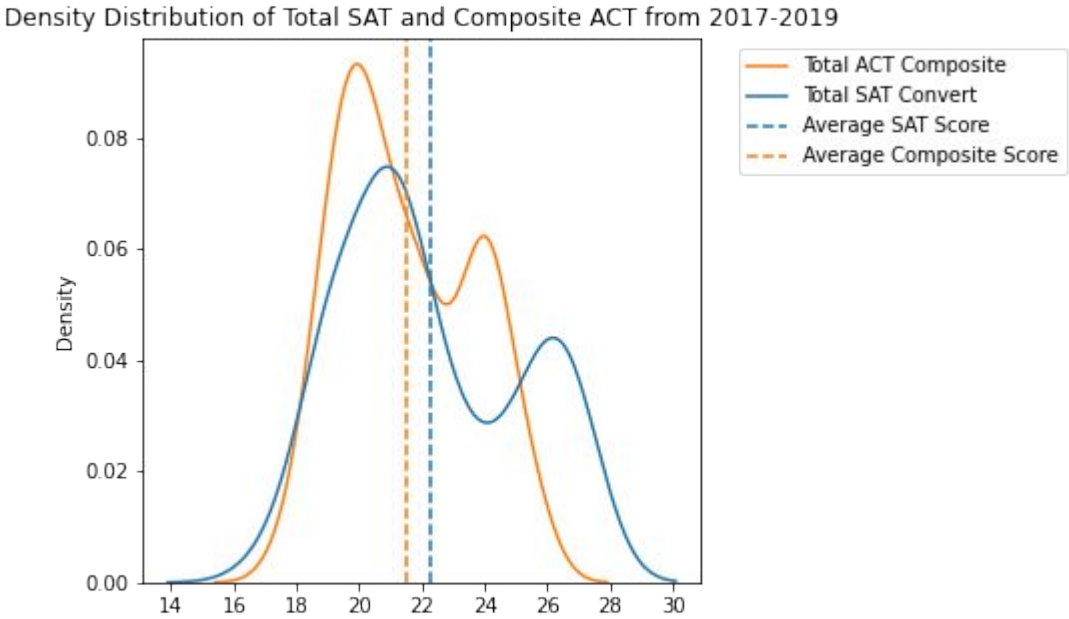
Overall Average ACT Composite Scores (2017 - 2019)





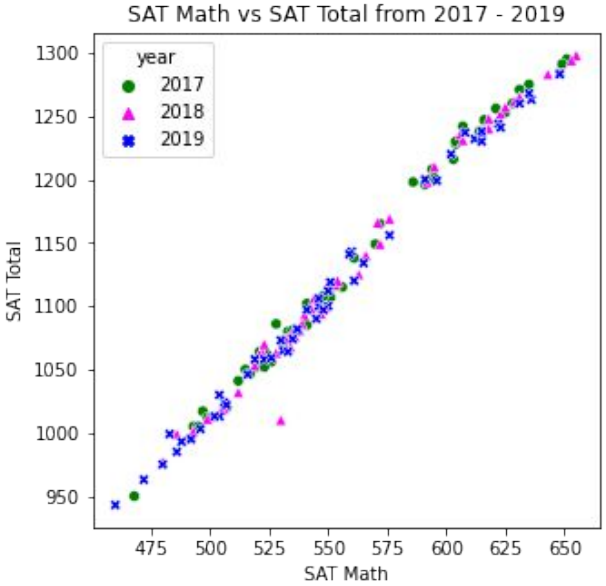
Overall - SAT vs ACT Trend (2017 - 2019)

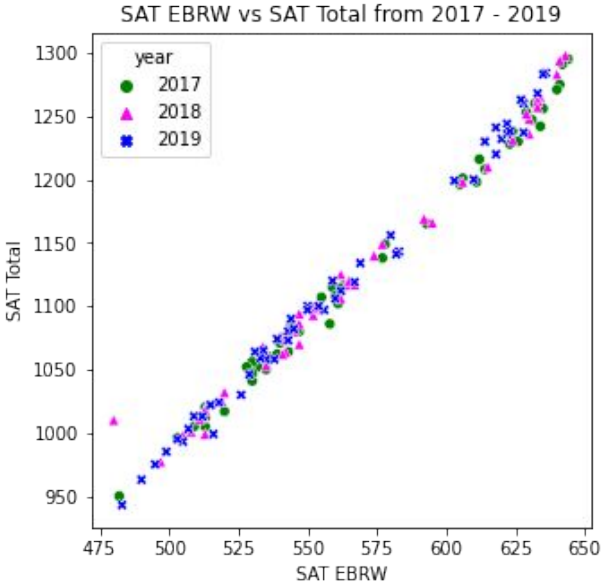
- Similar distribution trend
- Higher SAT scores



SAT Scores (2017 - 2019)

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





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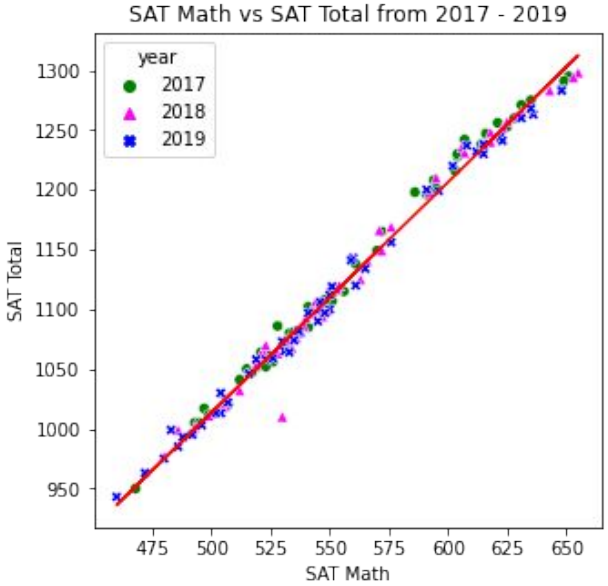

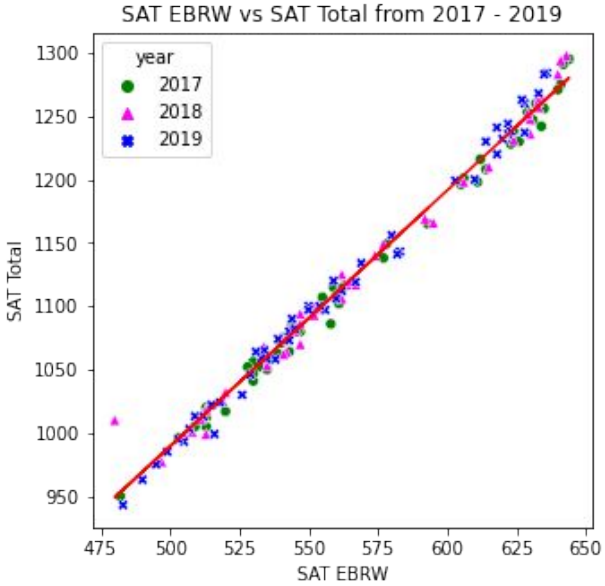

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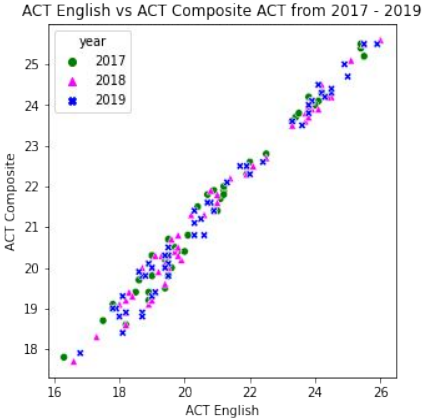

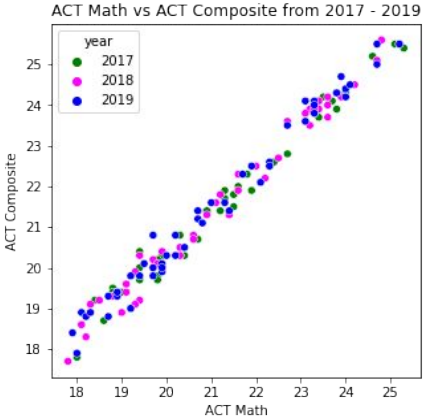

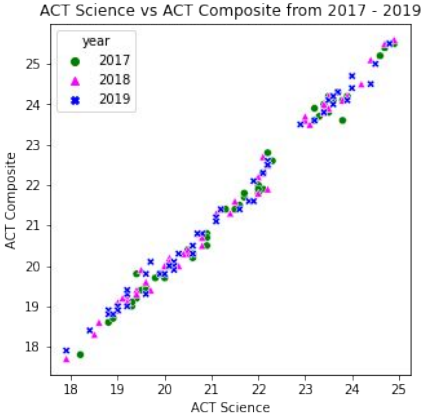

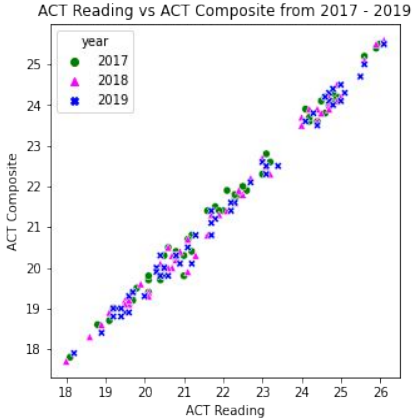

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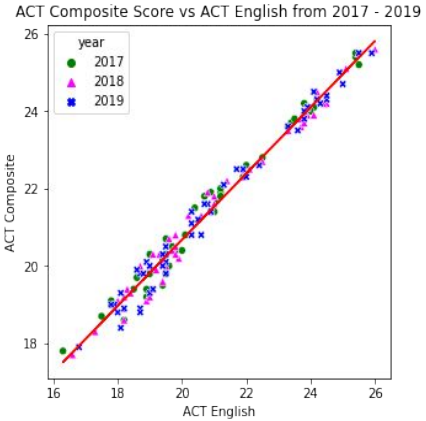
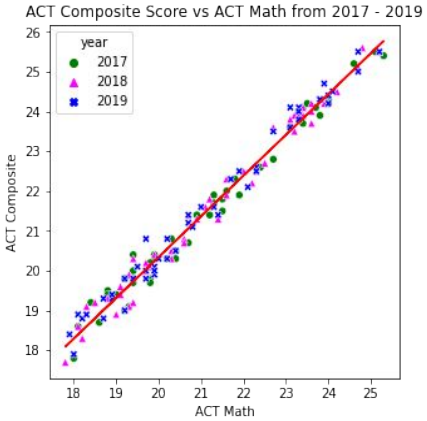
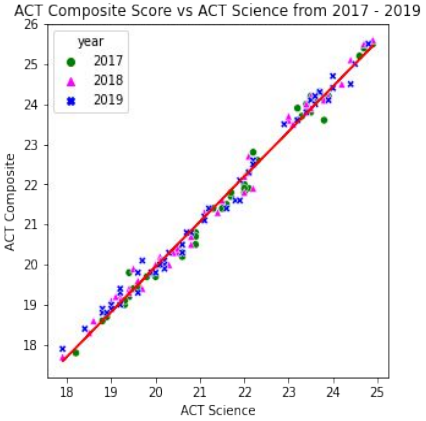
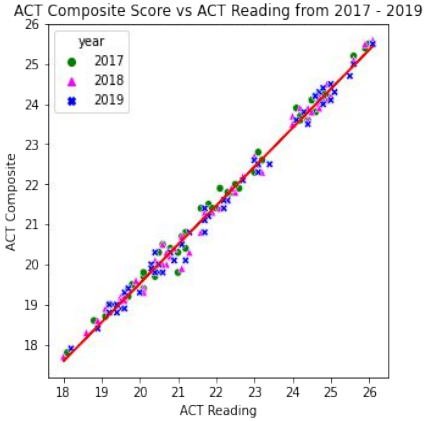


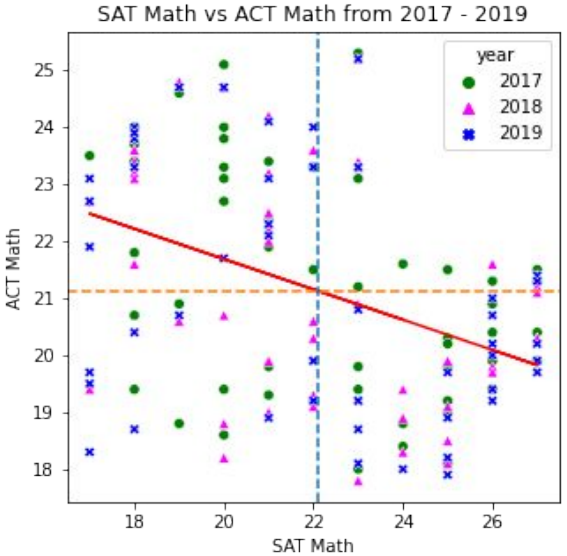


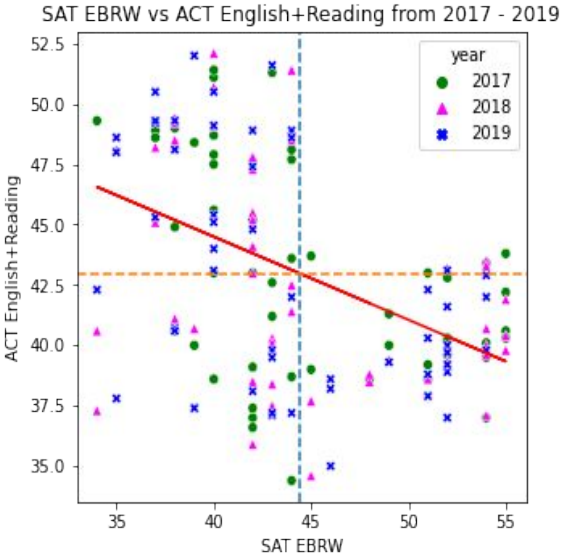


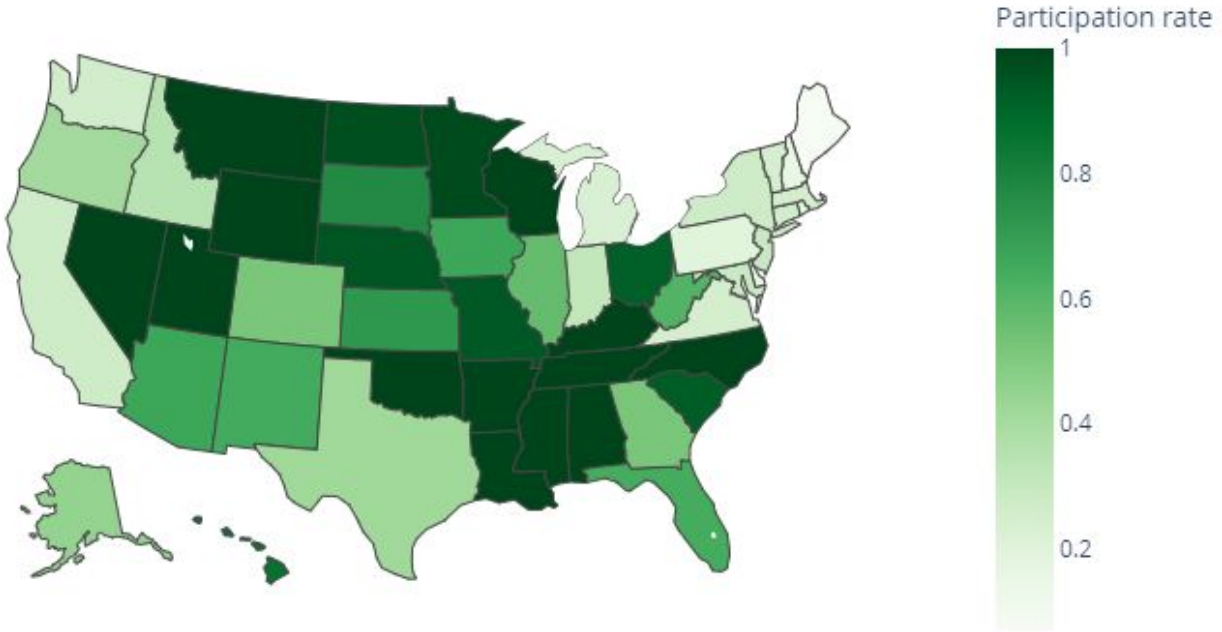


SAT vs ACT (2017 - 2019)

- No association seen
- Data is too sparse out



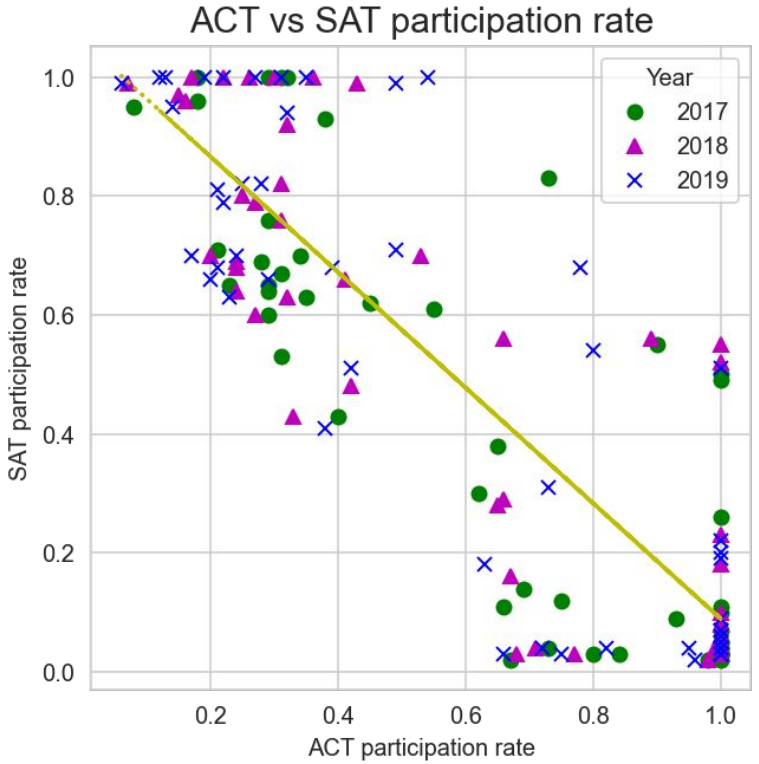




Does a state's ACT/SAT participation rates have any association with her ACT/SAT performance?

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

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



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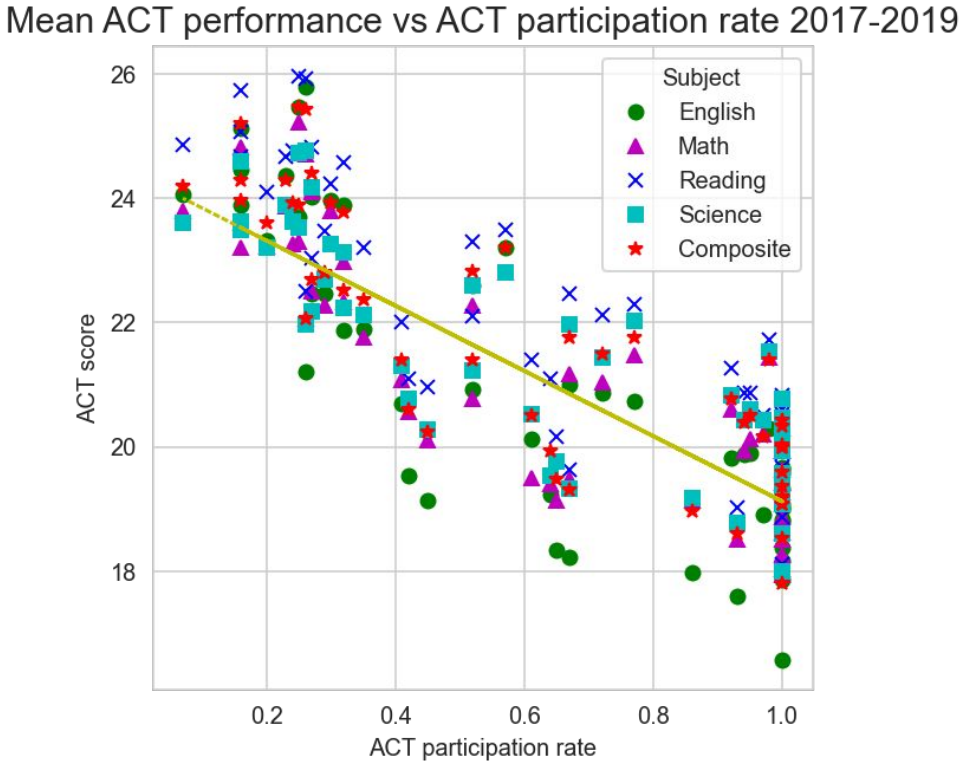
- **Negative** correlation between ACT performance and ACT participation rates



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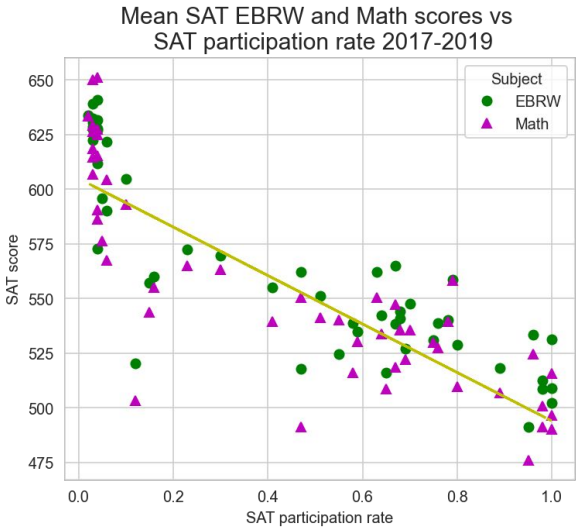

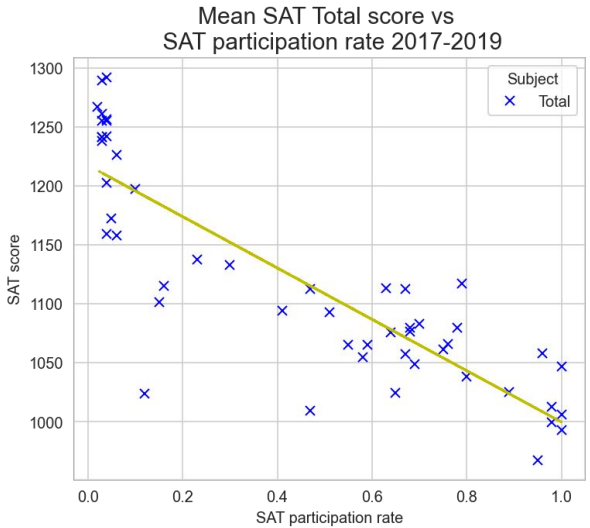

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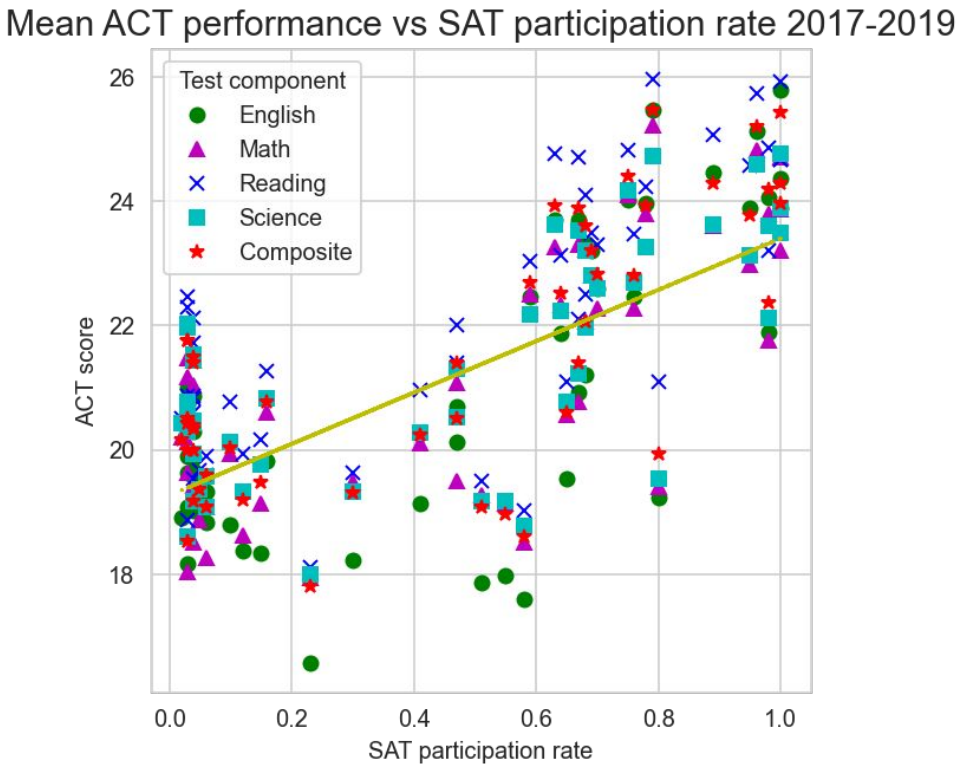

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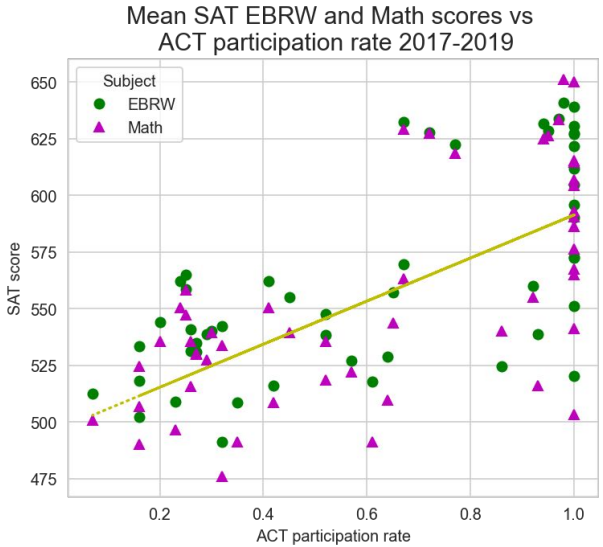
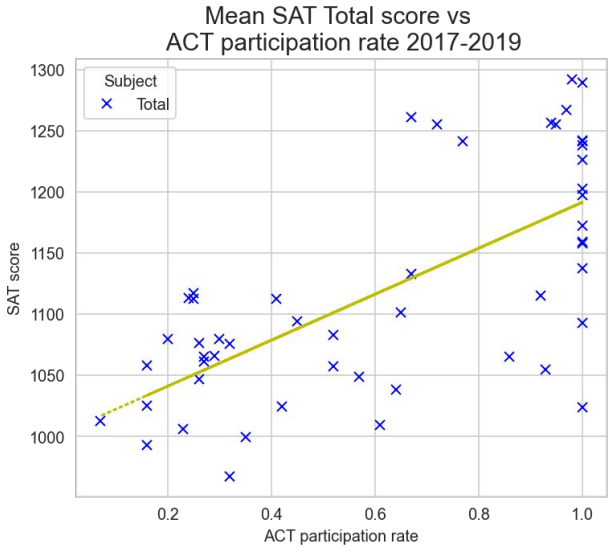
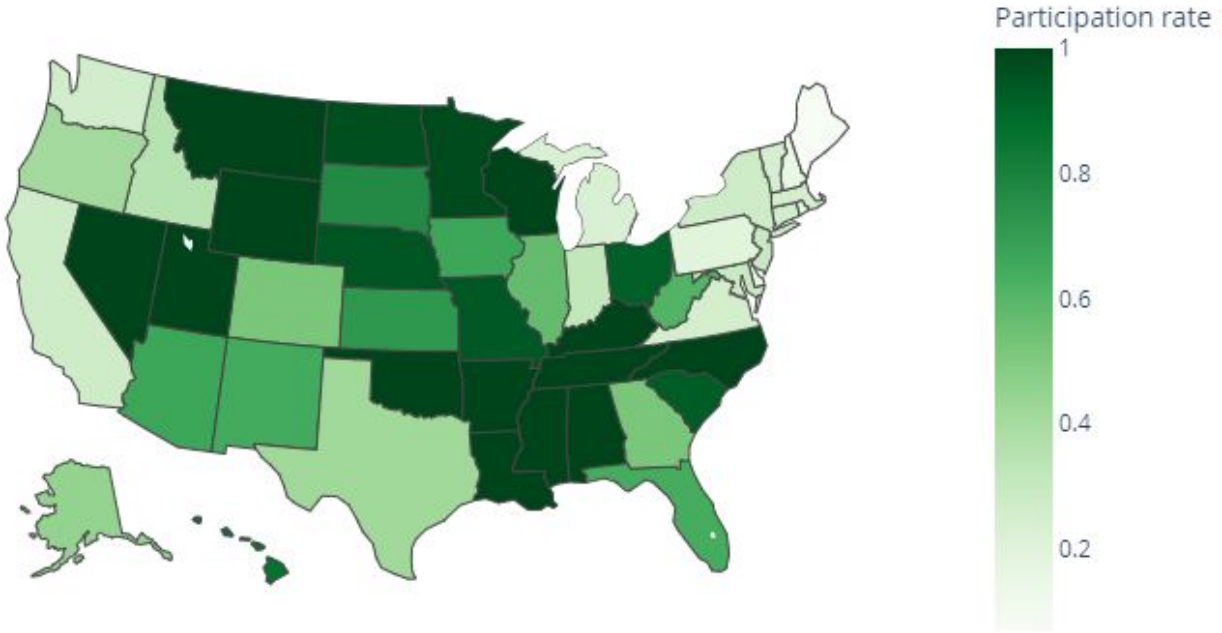
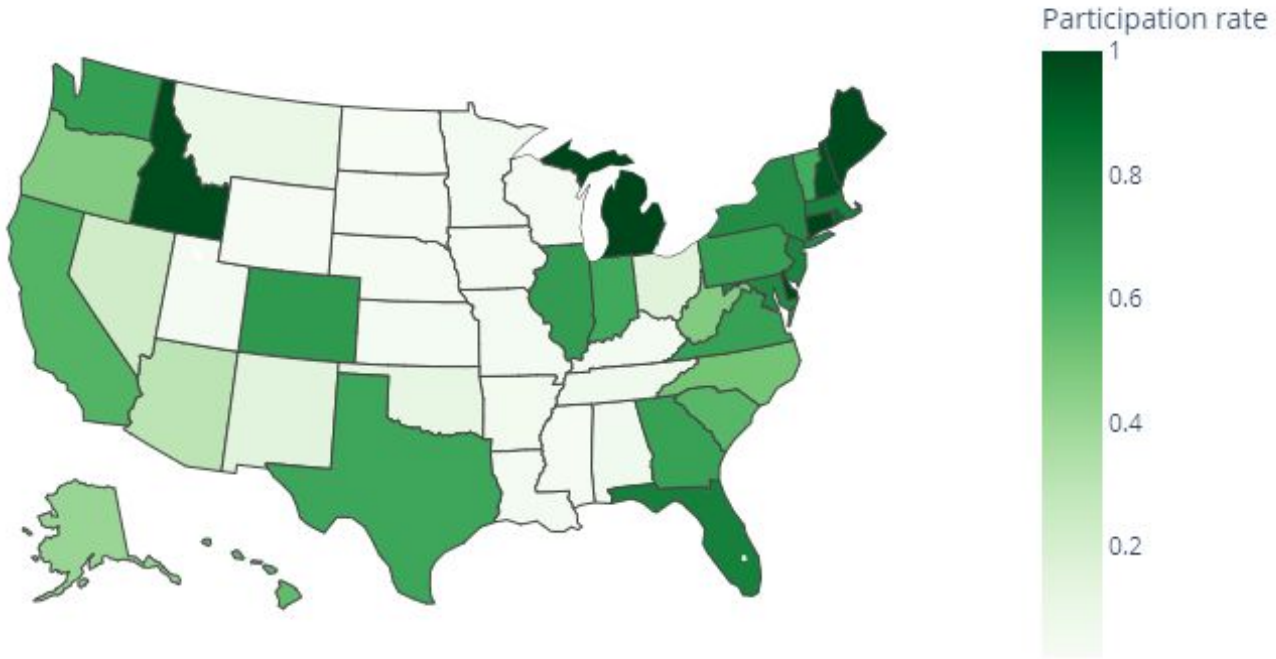




ACT mean participation rate by State



SAT mean participation rate by state

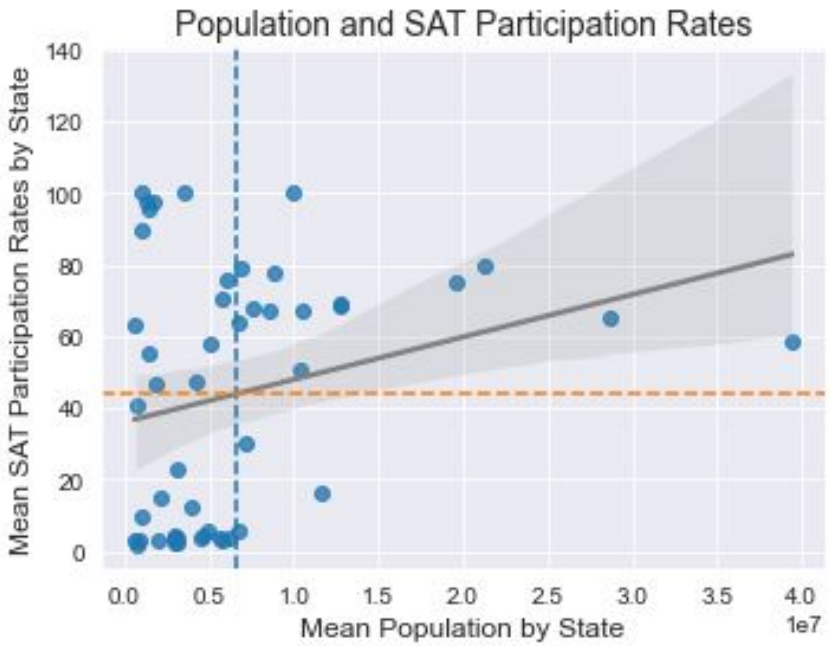


Population → Participation Rates

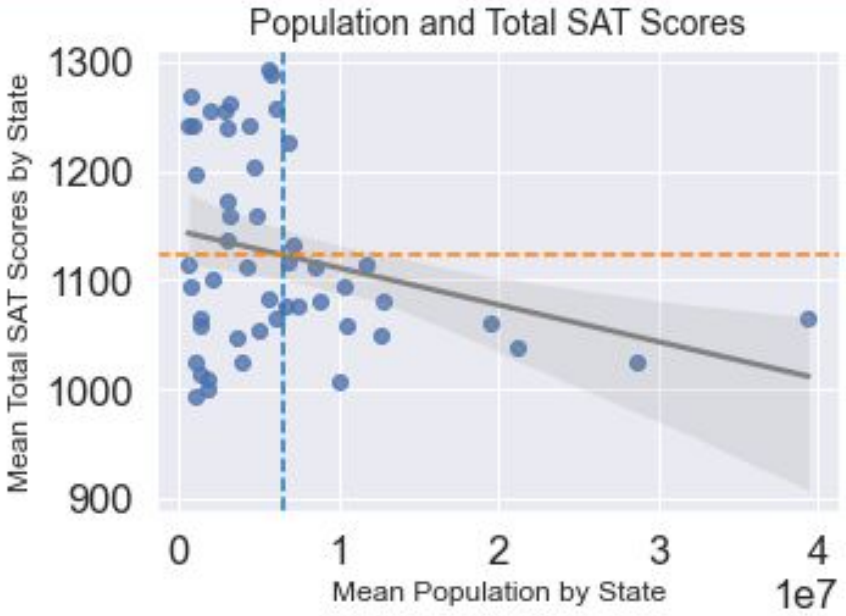
Household Median Income → SAT Scores

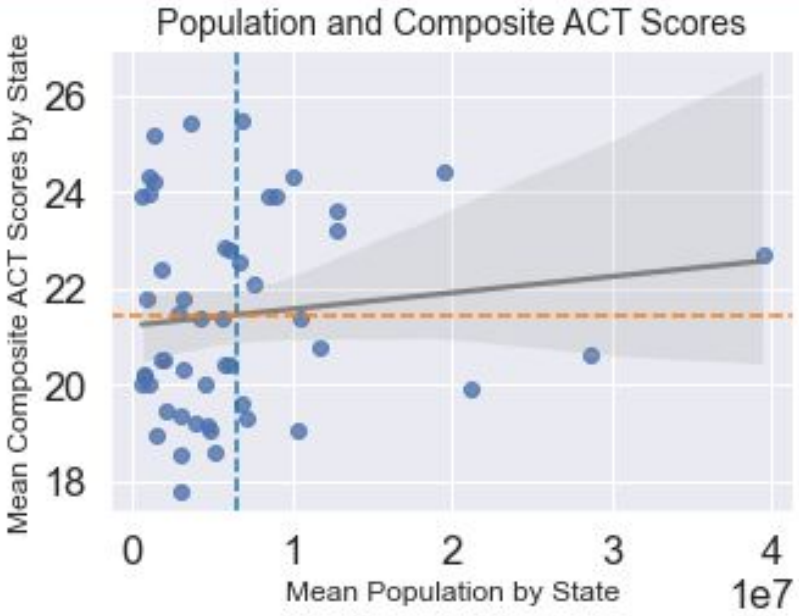
Household Median Income → ACT Scores

Population and SAT/ACT Participation Rates

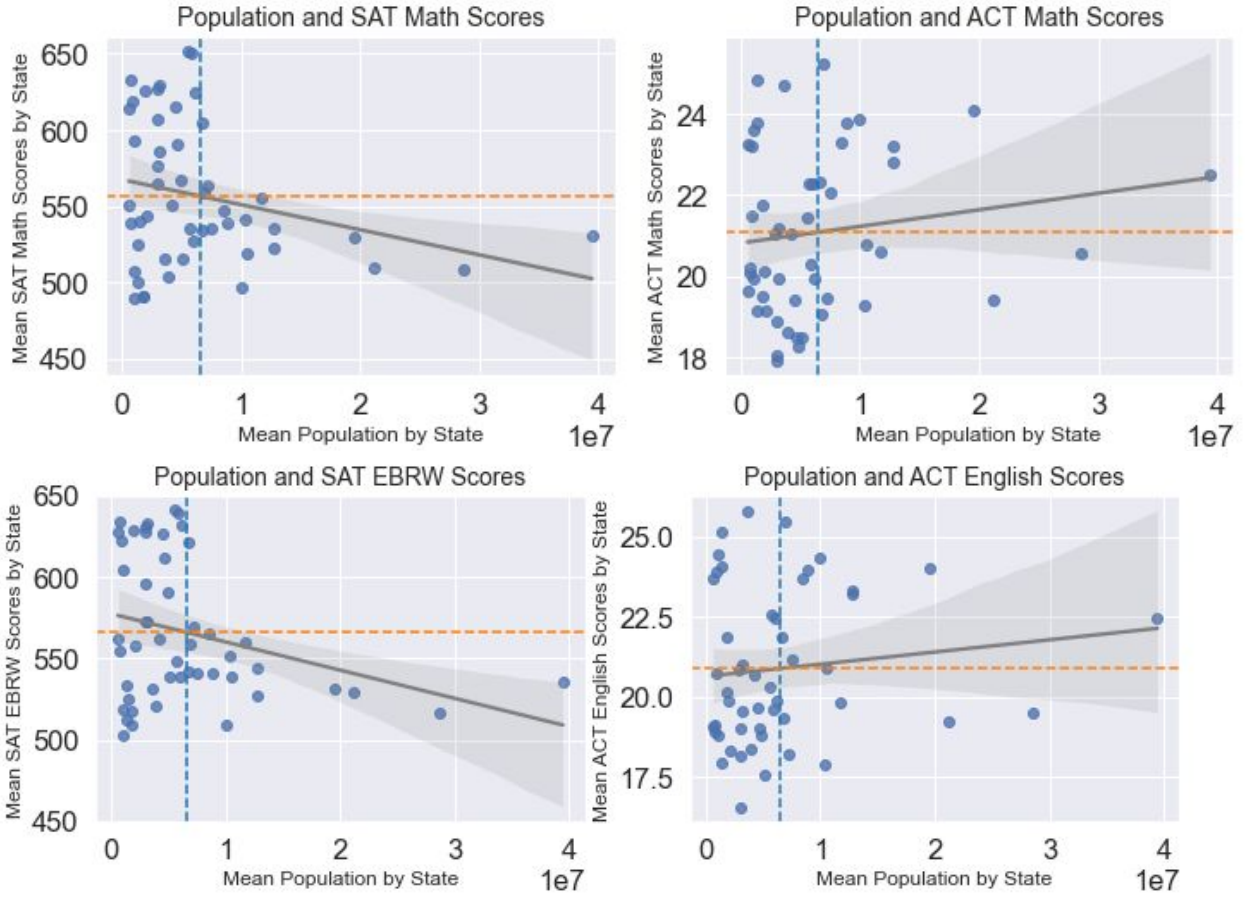


Population and SAT/ACT - Total/Composite Scores

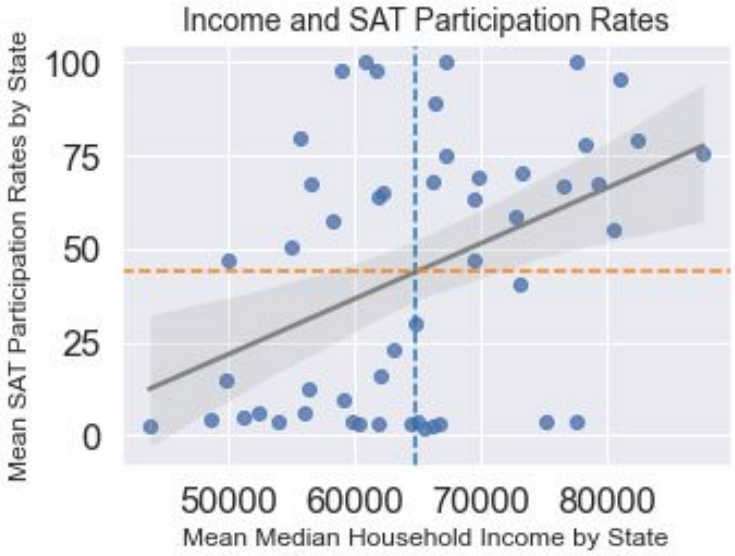


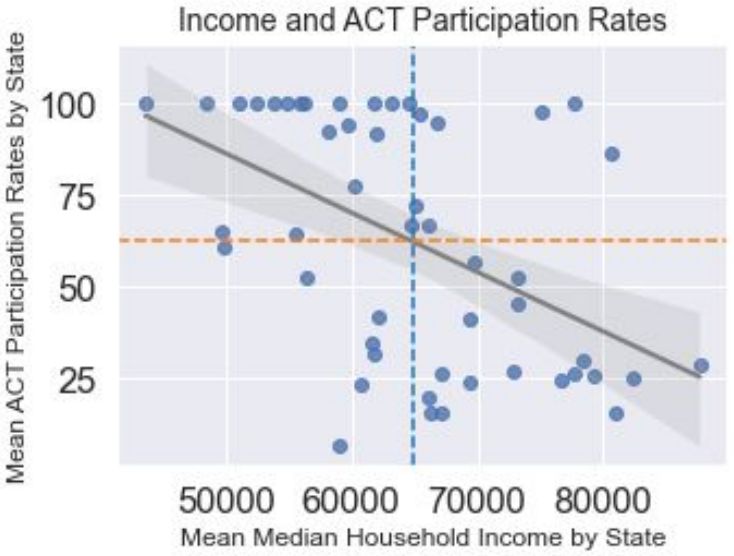


Population and SAT/ACT Scores - Math/EBRW/English

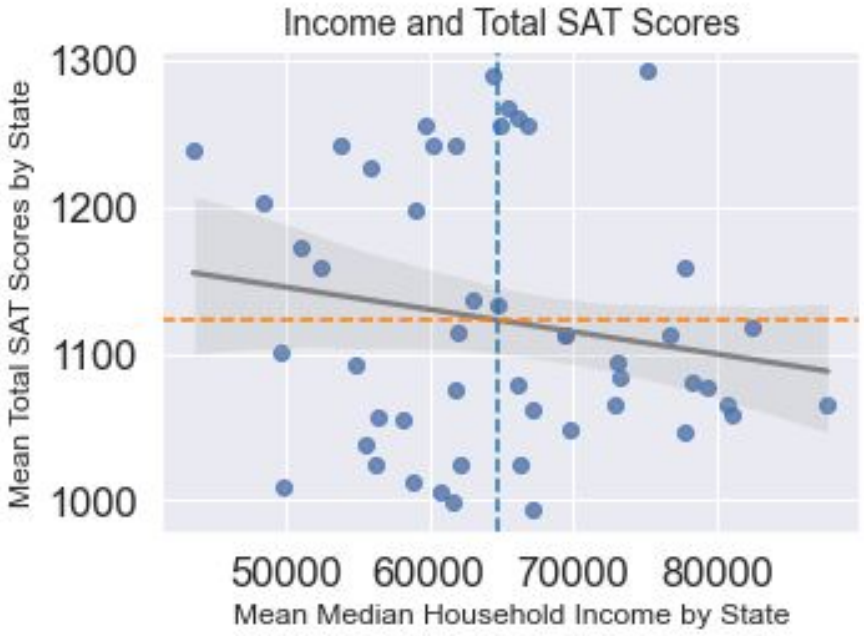


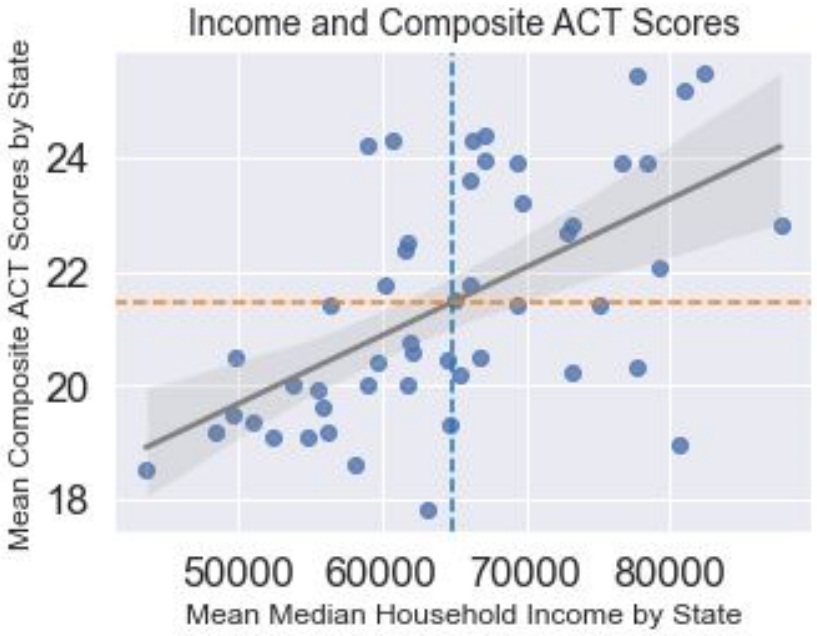
Median Household Income and SAT/ACT Participation Rates



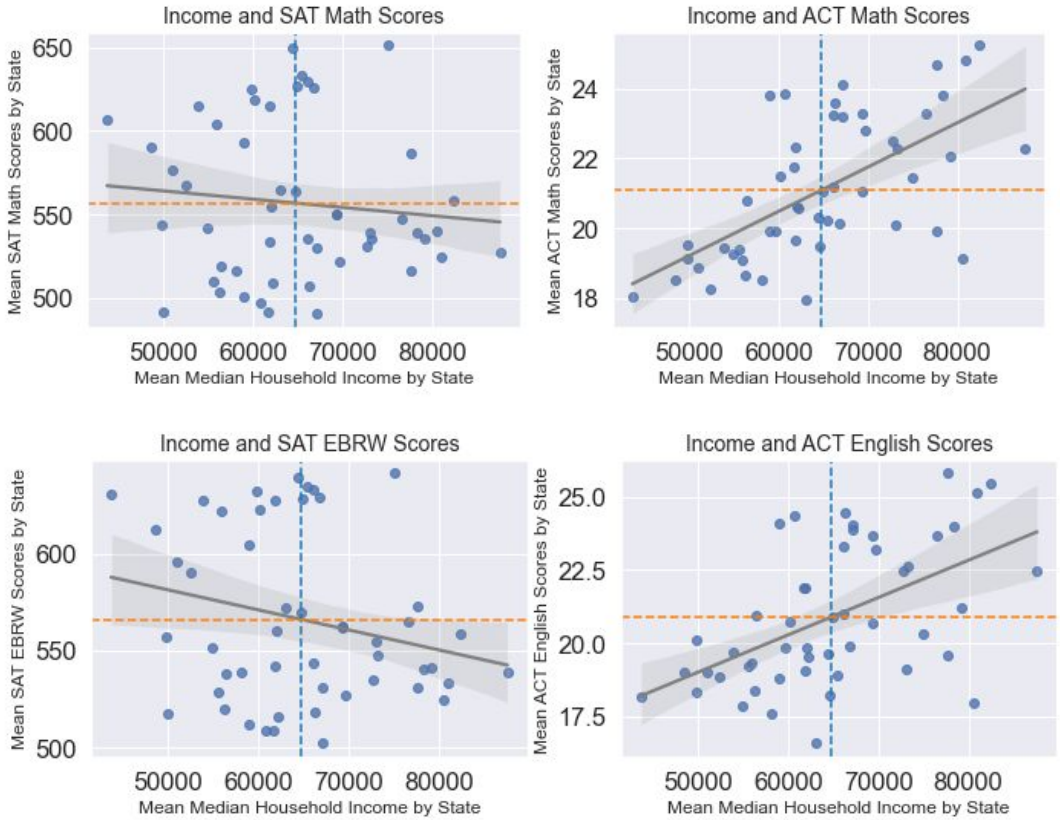


Median Household Income and SAT/ACT - Total/Composite Scores





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



Income and Population Analysis

1. Larger Populations have high SAT participation rates and low ACT participation rates
2. Larger Populations have low SAT scores and high ACT scores
3. High Income States have high SAT participation rates and low ACT participation rates
4. High Income States have low SAT scores and high ACT scores

	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	↑	↑	↑	↑	↓	↓	↓	↓

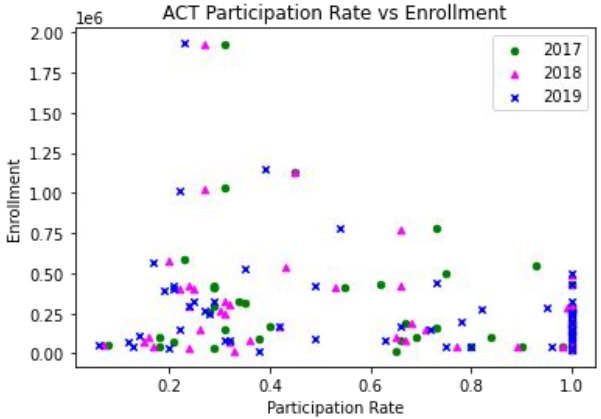
Analysis Limitations for Income and Population

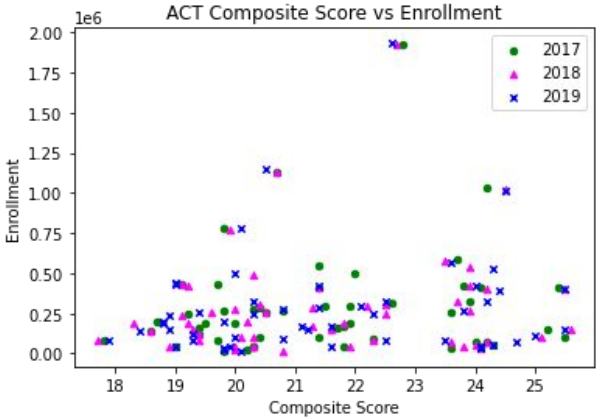
- Only used 3 years worth of data
- Only used participation percentage rates (absolute participation numbers more useful)
- Some findings at odds with what we would expect;
- (Exp. Higher Income states have lower SAT scores)

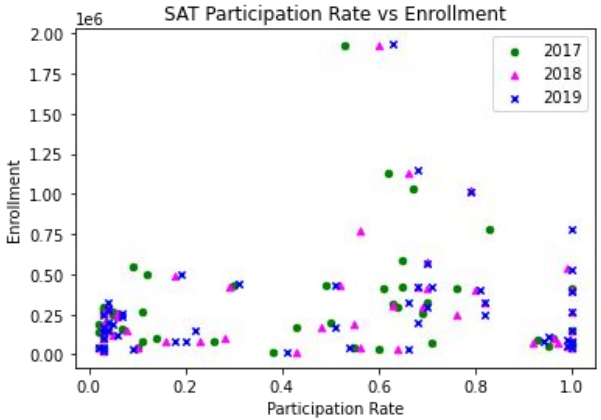
Recommendations for Income and Population Analysis

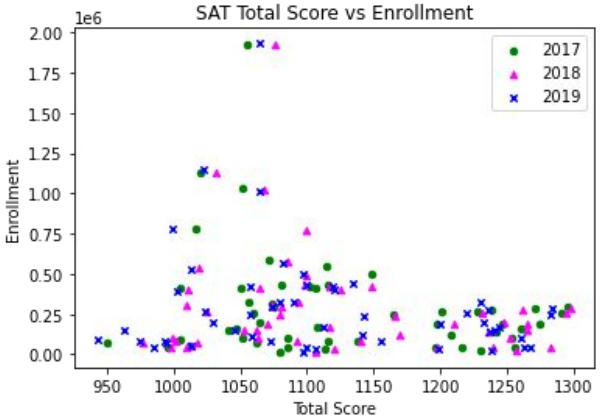
- Take a longer timeframe than 3 years (at least a decade)
- SAT and ACT tests should be free of charge (clearer picture on how population and median household income affects performance)
- More states encourage or make mandatory participation

Does college enrollment 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 between participation rate/total score and enrollment.

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)

Q & A