Final Presentation

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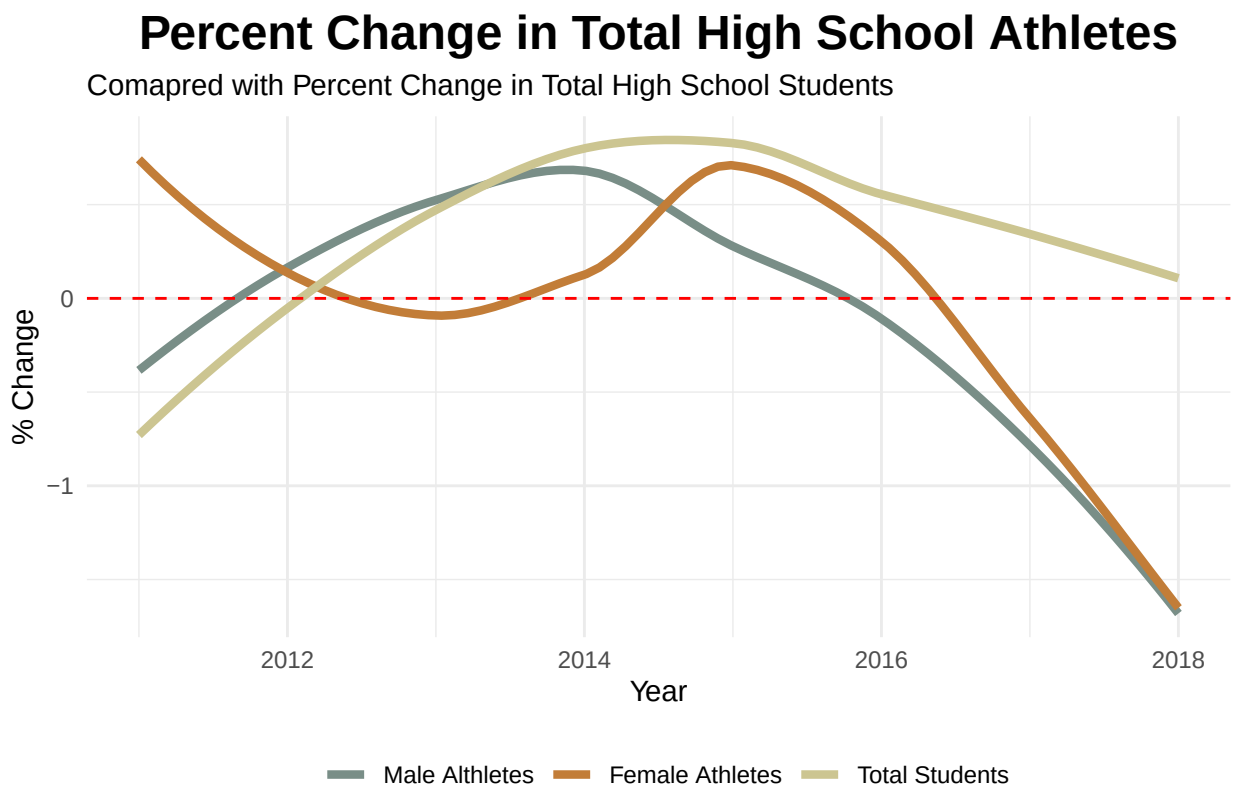
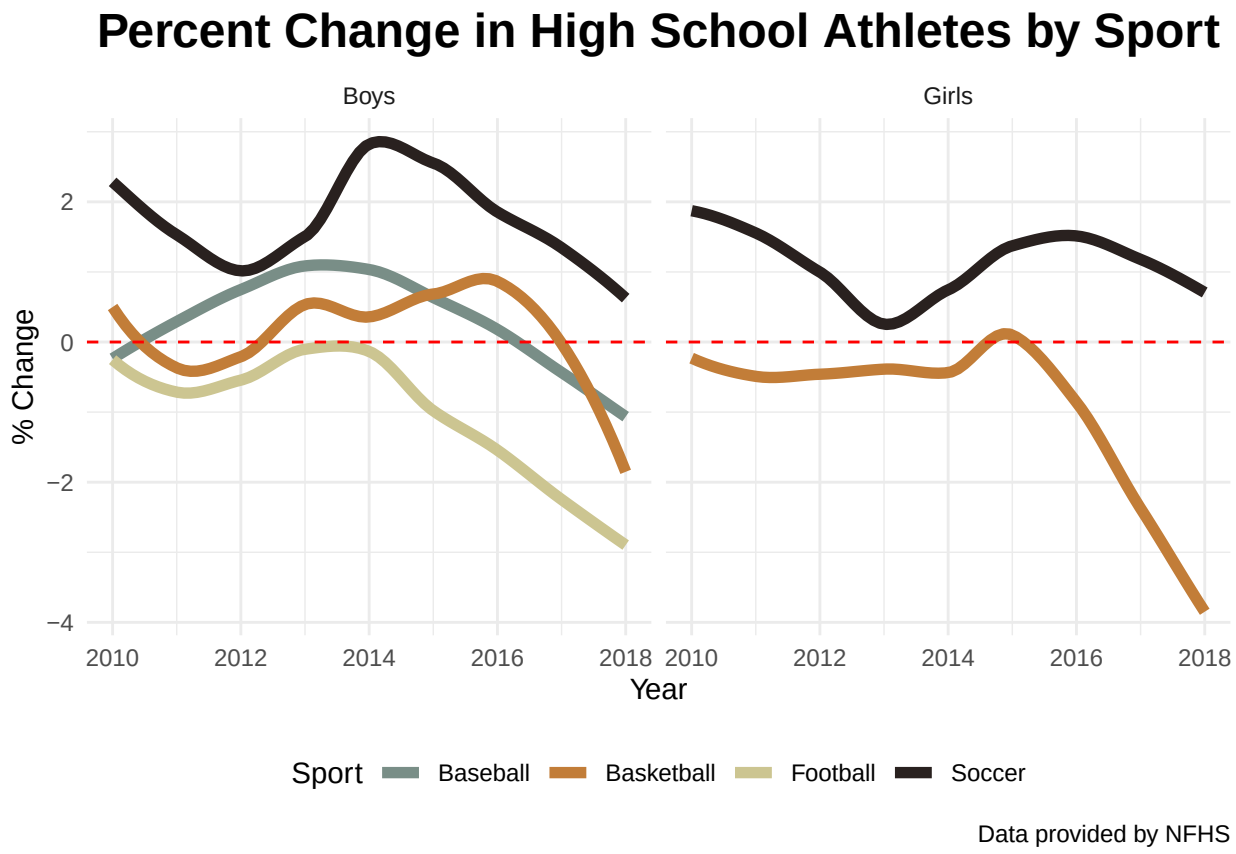
Athlete Participation



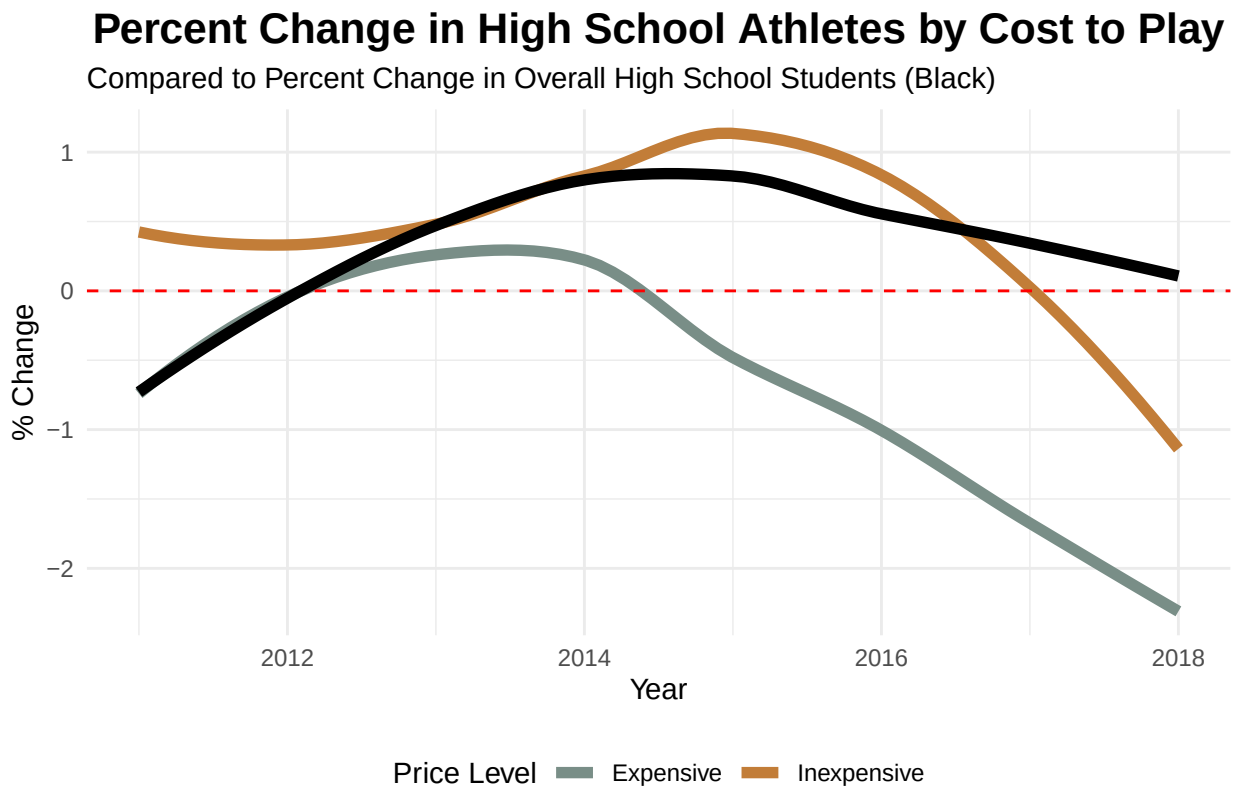
Over the past 10 years there have been changes in the number of students who are participating in sport. As shown in the graph above, from about 2010 to 2015, both male and female participation changed fairly closely with the totla number of high school student in the United States. However, starting in about 2016 we see that the sport participation pulls away from the number of high school students. In this project report, we will analyze what charateristics of sport have caused the decline in sport participation.



Hypothesis 1

The first hypothesis is that participation levels will be different by sport.

As shown in the graph above, the only sport that showed a constant increase in sport participation was soccer. Football shows a negative trend, where the number of athletes participating is decreasing year over year. This helps support the hypothesis that the participation change is different by sport. This leads us to question which characteristics are common among sports with declining participation versus increasing participation.



Hypothesis 2

More expensive sports will show a more consistent decline in sport participation.

Sports were split into two factors, expensive or inexpensive, depending on the sports average annual cost according to a MetroKids report. Based on this seperation, it was shown that the more expensive sport strayed significantly from the overall trendline for change in student population. The less expensive sports, even in 2018, followed pretty closely with the changes in student population. This leads to the conclusion that students are participating less frequently in sports that are consistently more expensive, which demonstrates how cost is a huge indicator of the decreasing sport participation.

Hypothesis 3

Sports with higher rates of injury will show a decline in participation.

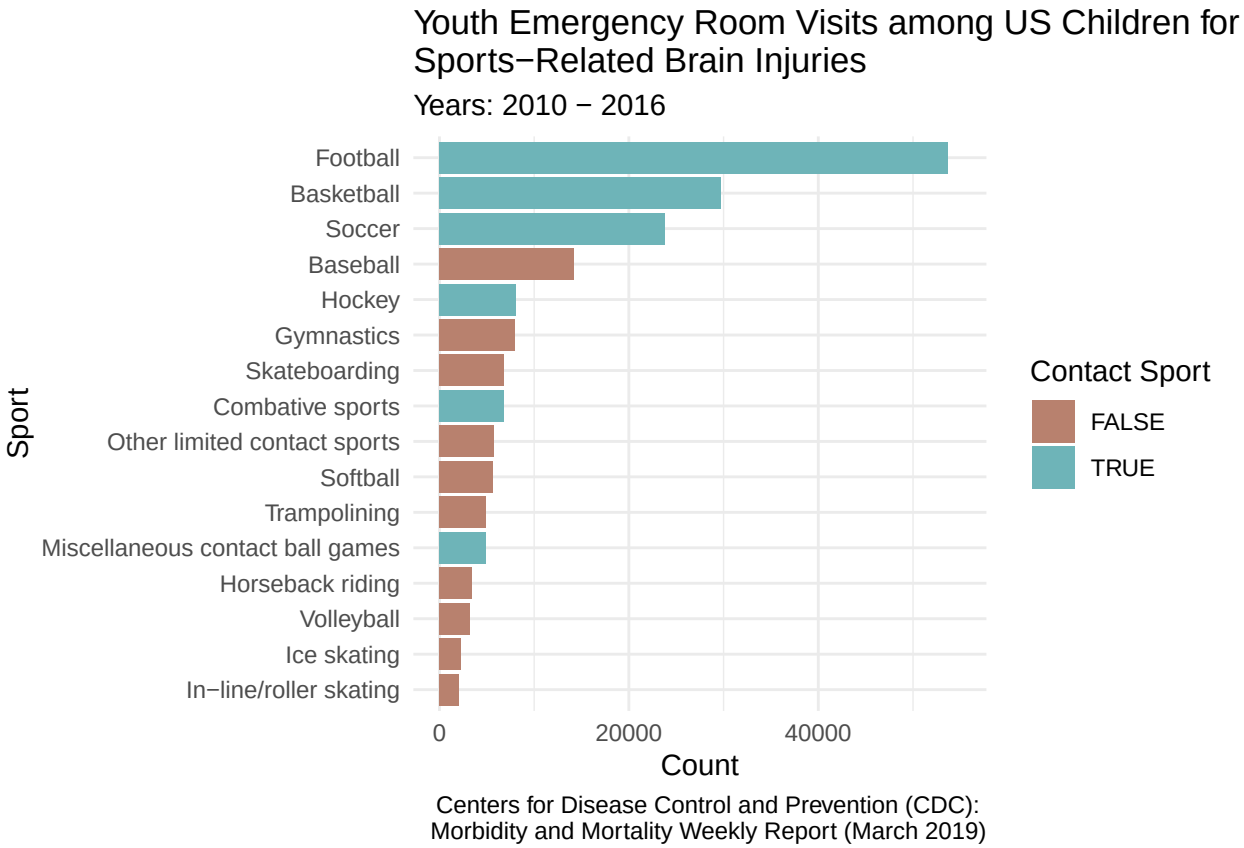
Injuries - Carmen Canedo

The main questions I looked into dealt with the potential impact of injuries in high school sports participation. So, within our overall hypothesis, I developed a few more that are specific to injuries.

My hypotheses were as follows:

1. Contact sports will have a higher number of concussions than limited or no contact sports.
2. Gender may be a factor in the overall rate of injuries in high school athletes.
3. The risk of injury negatively impacts participation in high school sports.

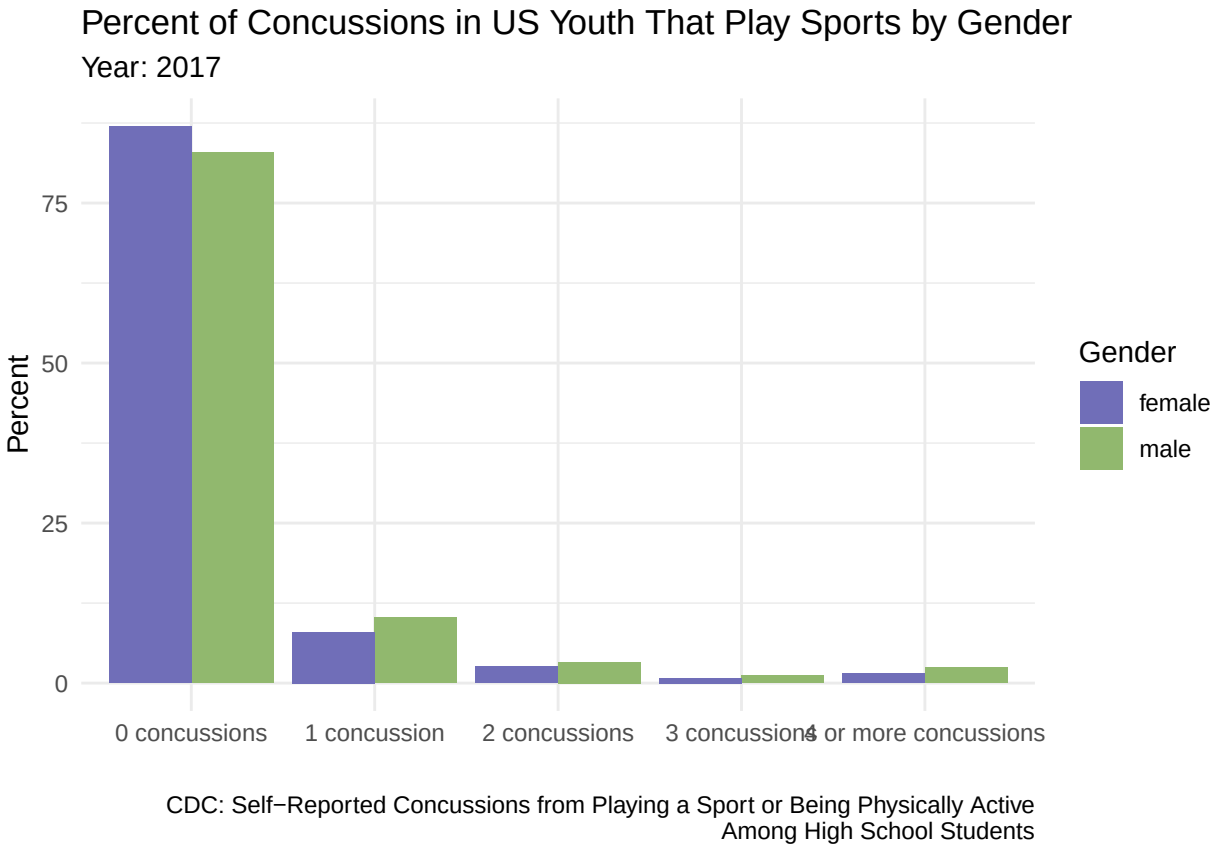
How many kids are getting hurt?



In order to test my hypothesis that contact sports will have a higher number of concussions, I used data from the CDC's Morbidity and Mortality Report. As you can see, Football, Basketball, & Soccer make up the majority of youth emergency room visits. Non-contact sports, therefore, appear to be less likely to result in Sports-Related brain injuries.

This suggests that there may be a correlation with participation and concussions, particularly with football.

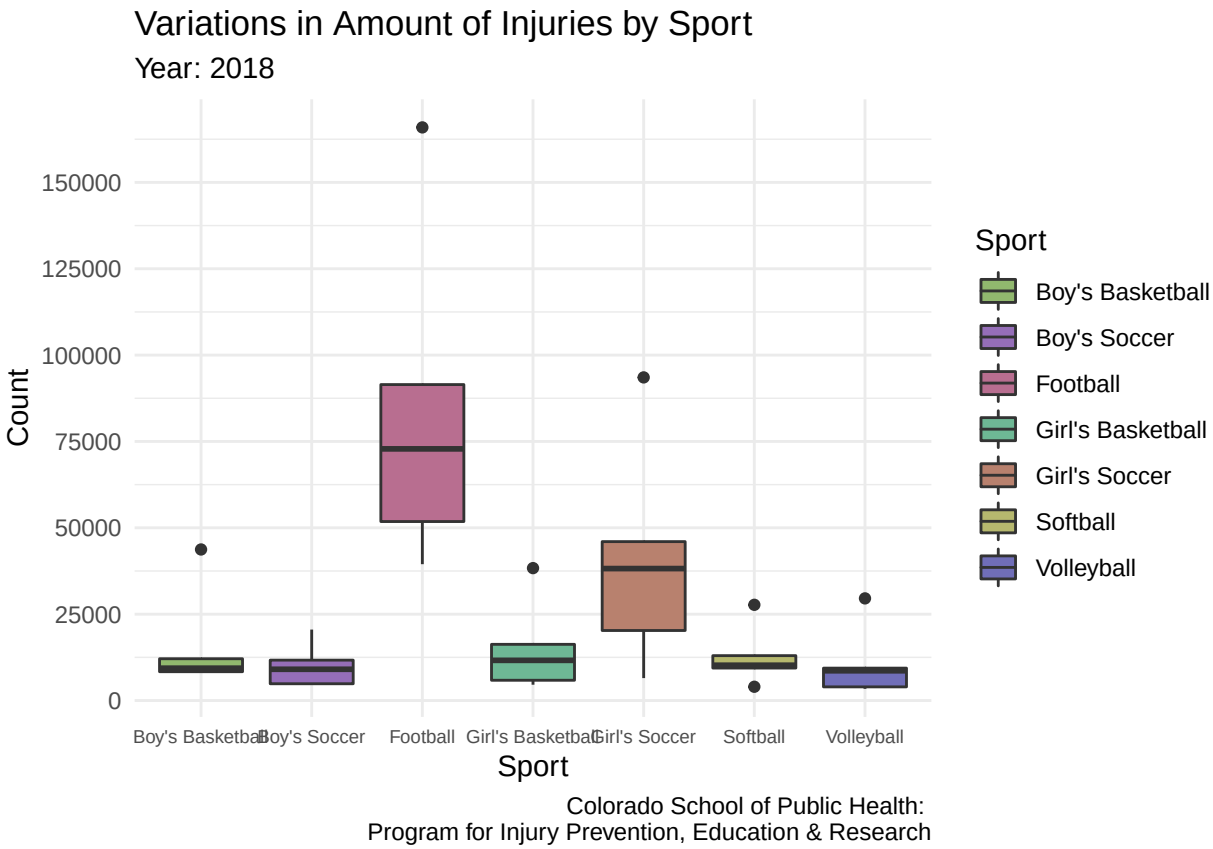
What demographics are most affected?



Next, I compared the rates of concussions by gender. It is important to note that nearly 80% of US Youth did not get concussions from sports in 2017 when this survey was conducted. Of those that do, they are likely to only get one concussion, and it appears that males tend to have concussions slightly more often than females.

What sports have the most injuries?

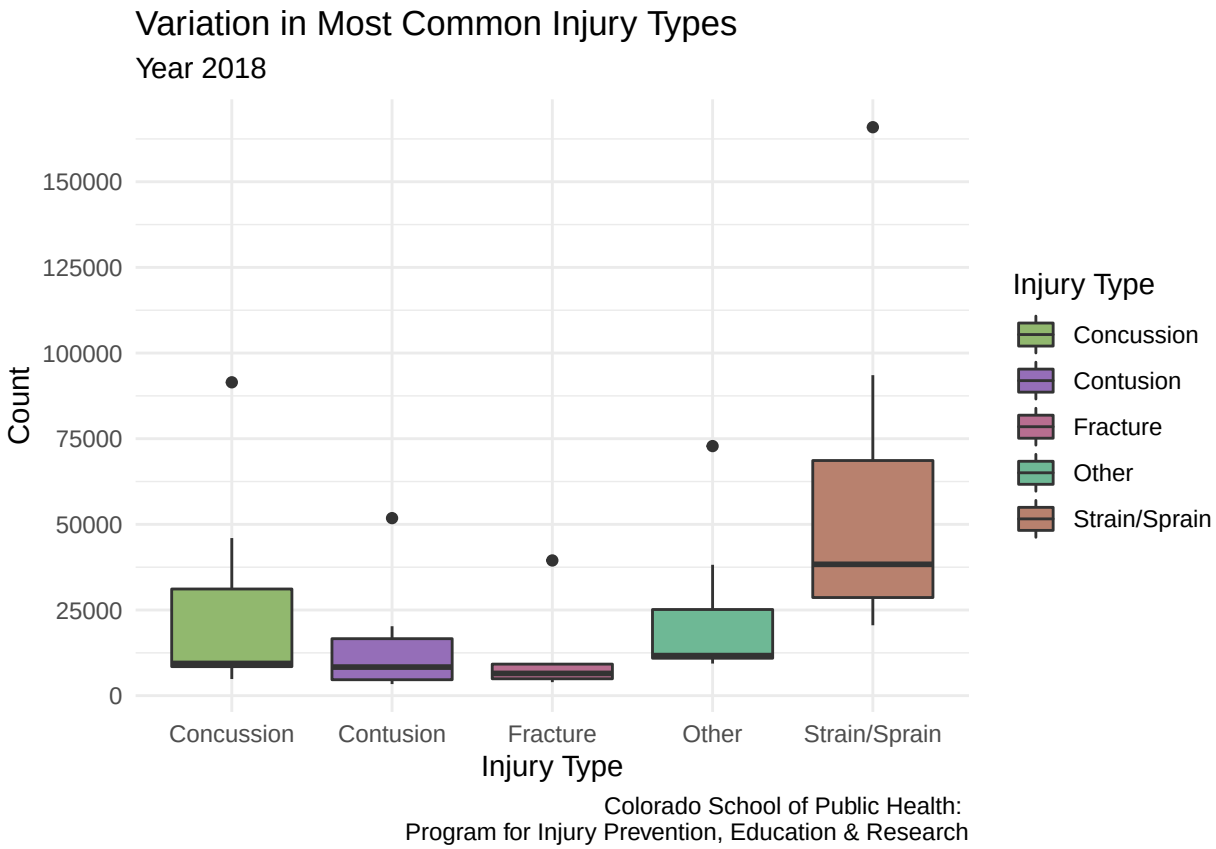
Injuries by sport



This led me to narrow in my focus, so I looked at the variations in injuries by sport in 2018. One thing I thought was really interesting was that Girl's Soccer had the second highest mean. From the previous graphs we looked at, boy's sports tended to have a higher number of injuries, so I had expected boys' contact sports to have higher numbers overall.

Football, though, clearly had the highest count of injuries. This could potentially contribute to public perception that contact sports like football are dangerous.

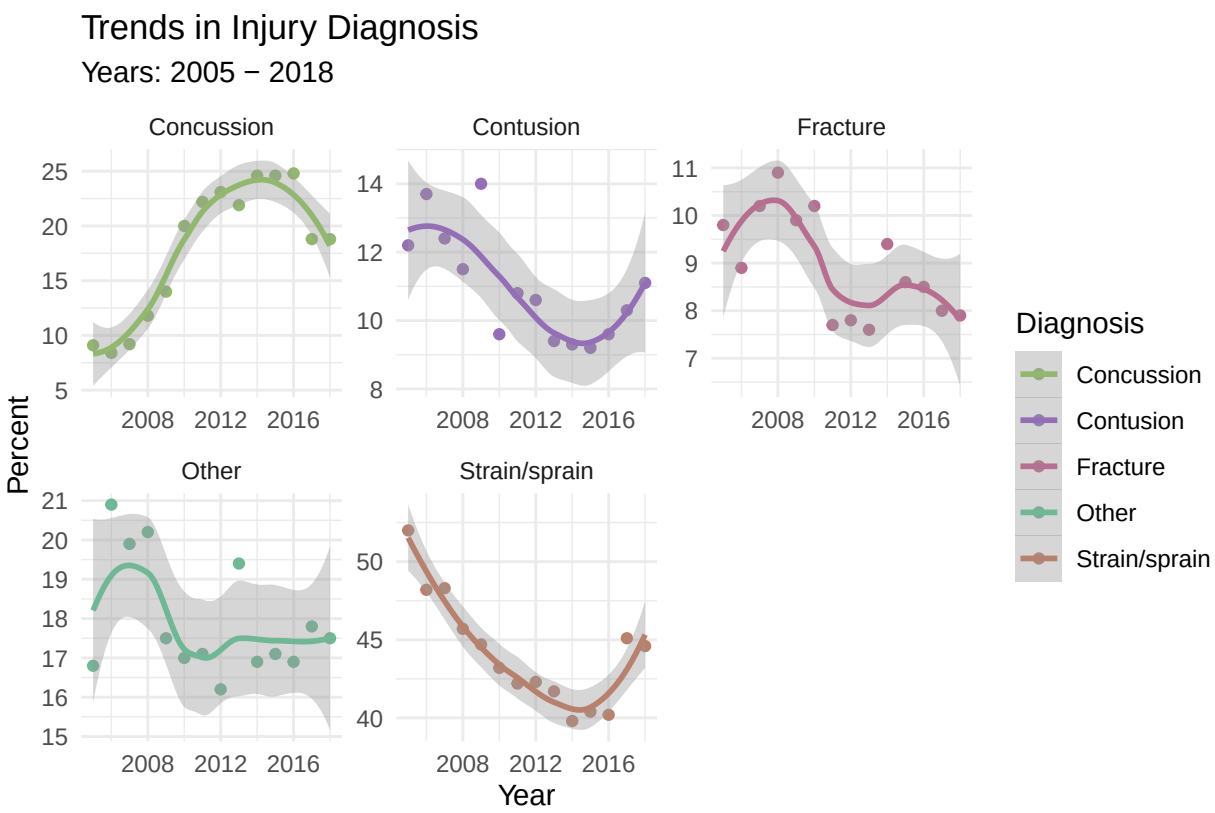
Injuries by type



Another variable of interest I looked at was the variation of injury type in 2018. It appears that sprains are the most common injury, followed by concussion.

How have injuries rates changed over time?

Diagnosis by year, color by type



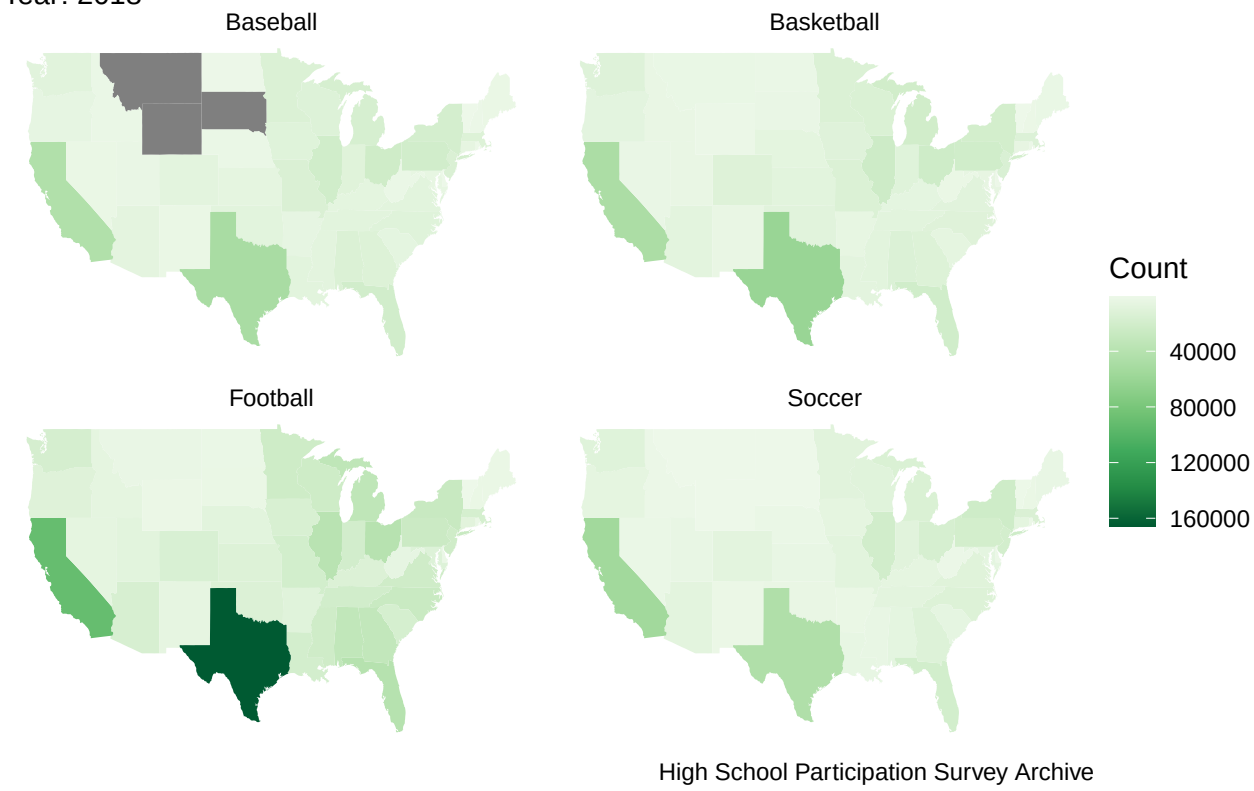
The next aspect I analyzed is how injury diagnoses have changed over time. This data comes from the Colorado School of Public Health's Program for Injury Prevention, Education & Research, and this study collected data on the main injury diagnoses high school students received from 2005-2018.

Concussions were the only type of injury to see an increase over the course of those 13 years, and it nearly doubled. It is possible that this large increase in concussions has led to a decrease in contact sports.

Participation

Who participates in sports?

Boys Participants Map

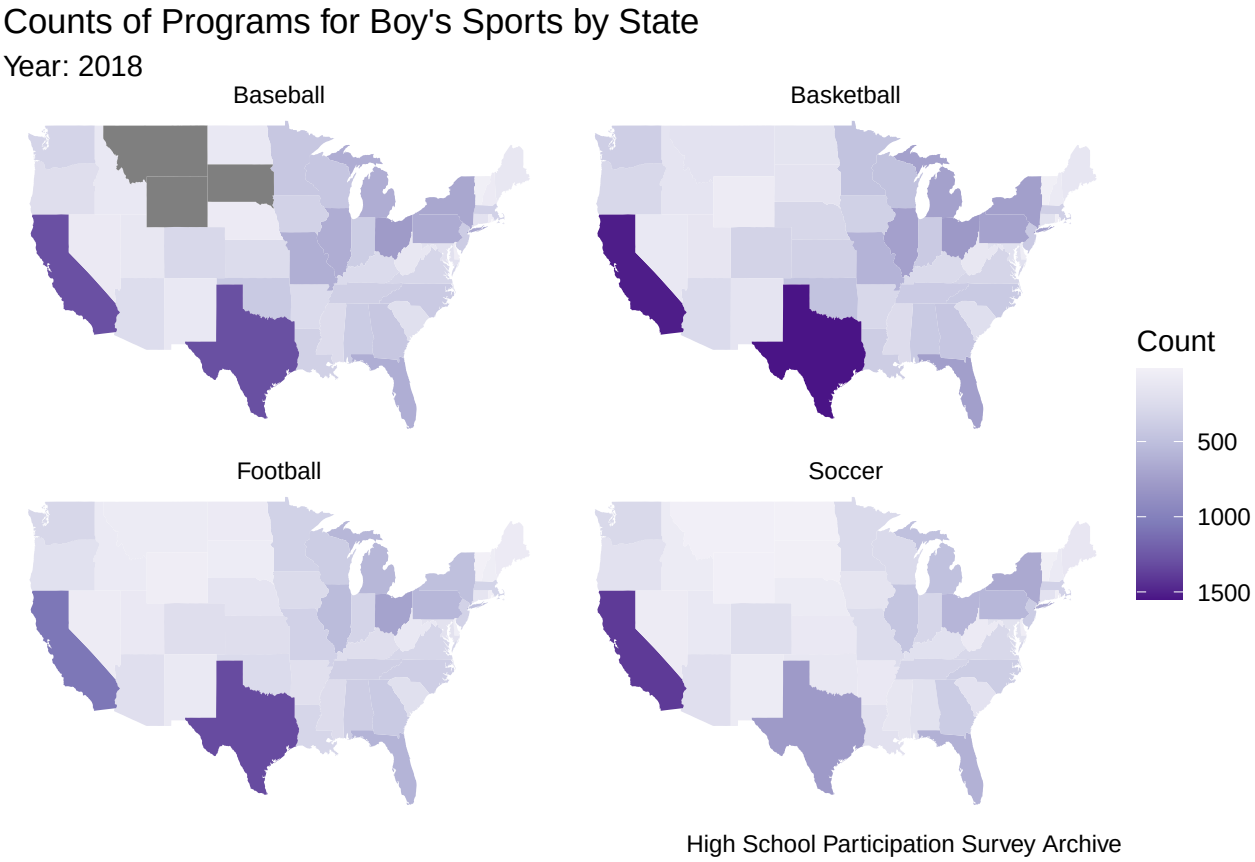


As I started wrapping up my analysis on injury, I began to look at sports participation by gender and by state for 2018.

Here, we can see the count of participants in 48 of the states, separated by sport. One of the most notable parts of this graph is that it appears the highest number of participants is for football in Texas. This was unexpected to me because of the data we have seen in the past few slides that football has a higher rate of injury.

The next most popular sports appear to be basketball and soccer, both of which had the highest number of participants in Texas and California.

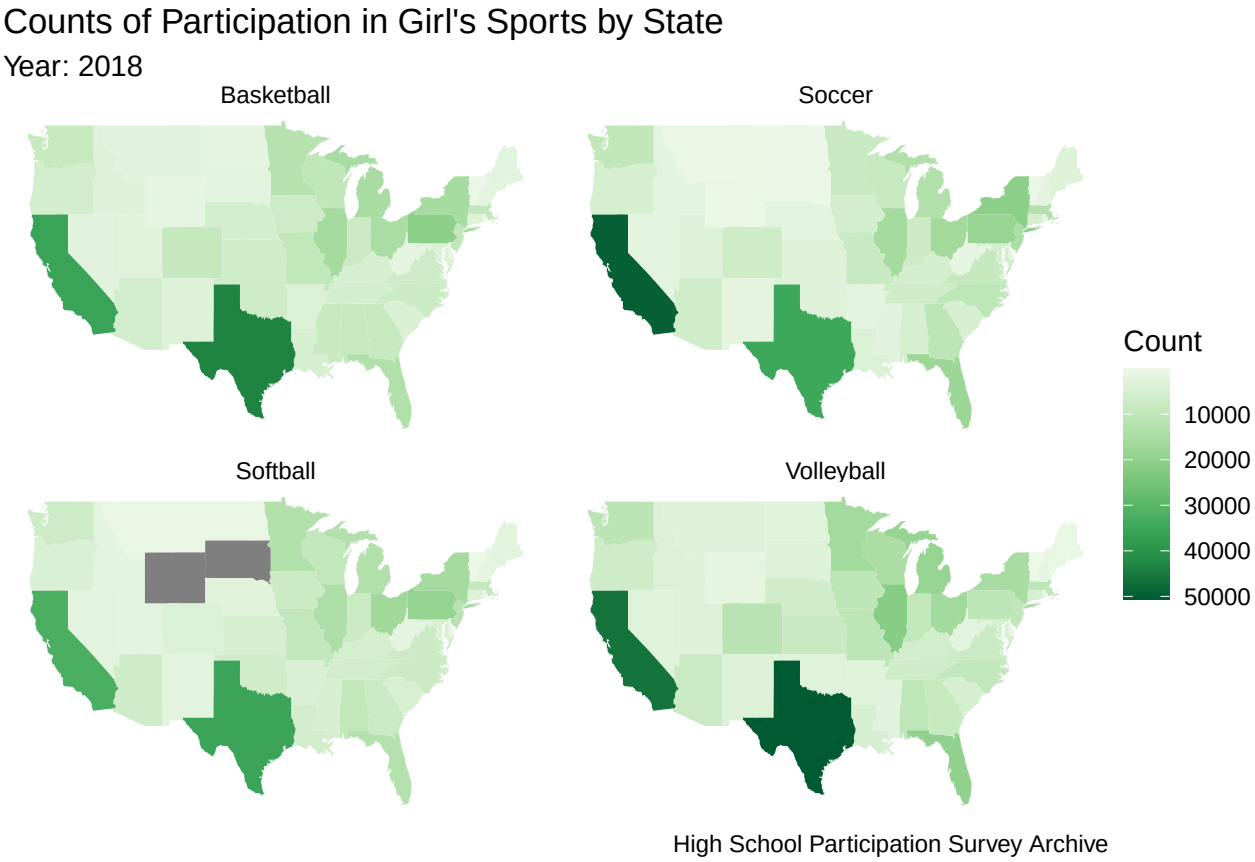
Boys Programs Availability Map



I next looked at the availability of sports programs by state for the same year. As you can see, there tends to be a slightly higher number of programs overall for basketball than for the other sports.

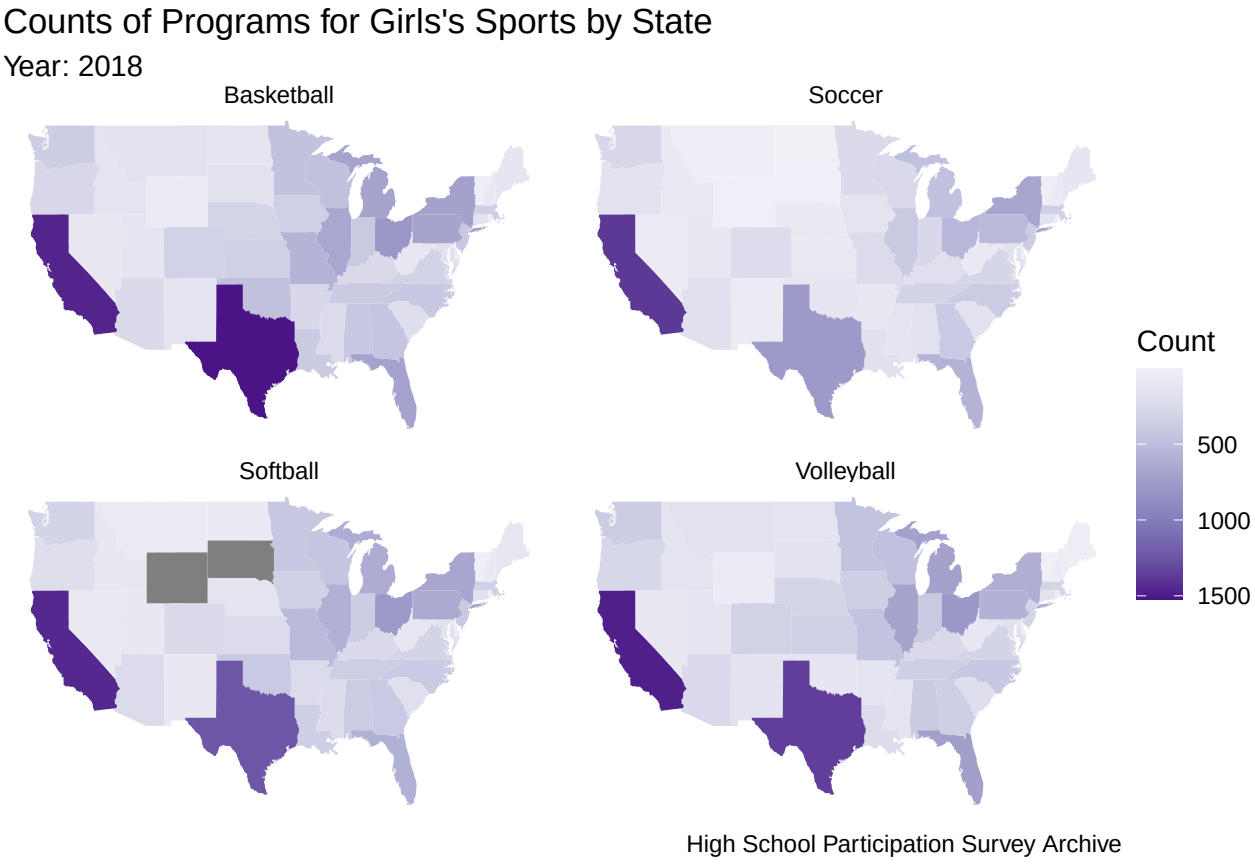
It is unclear whether sports with high rates of injuries have less programs available through school or travel teams, etc. There are several other factors that could play into the number of programs available like cost.

Girls Participants Map



The highest number of female participants appears to be for volleyball. This sport had the lowest average injury in the box plots we saw earlier, and this potentially supports our hypothesis as well, as it has lower number of injuries and more participation.

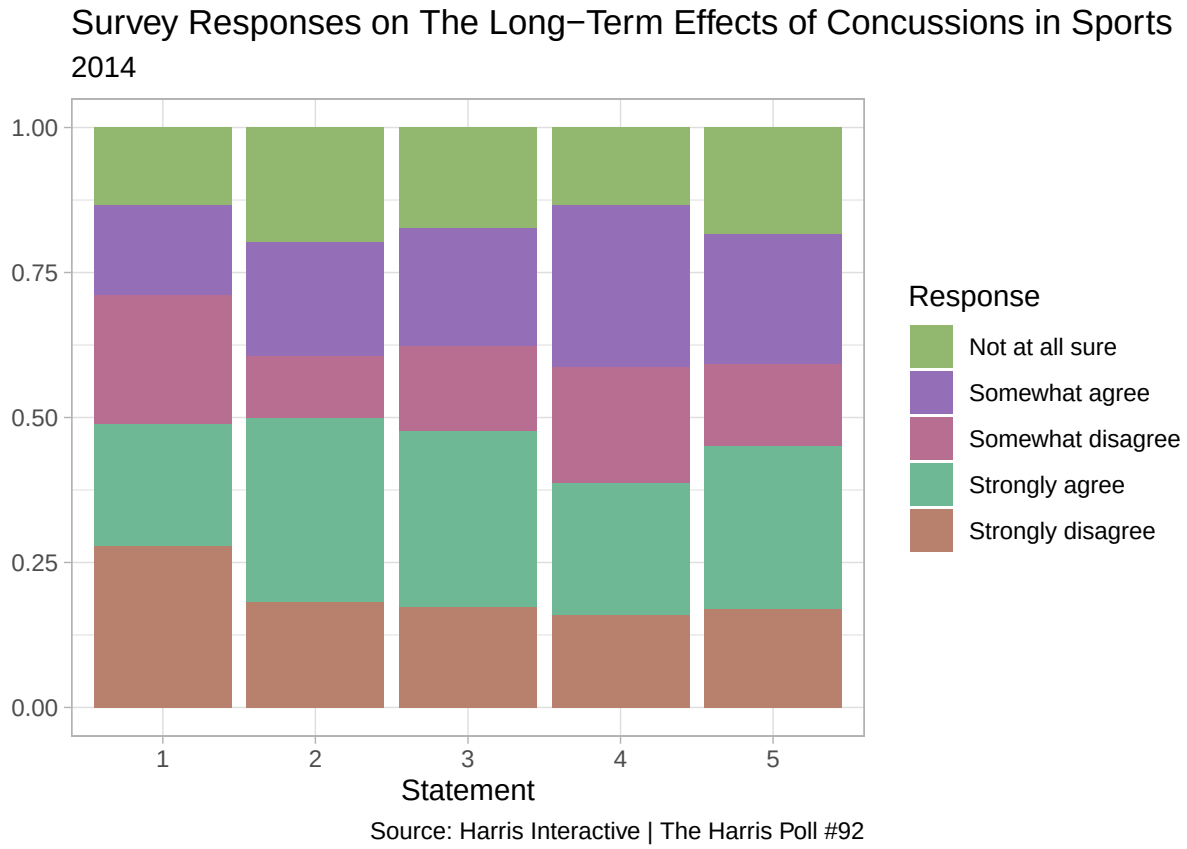
Girls Progams Map



Here is the availability of sports programs for girls by state. It appears the states where the highest number of programs are also happen to be for volleyball. It is possible that schools and sports organizations are more likely to invest in sports programs that are less likely to lead to injury.

Conclusion

Public opinion



Lastly, I felt that one of the best ways to get an idea of how the public views sports-related brain injuries in general was to look at a public opinion poll. This survey was conducted by Harris Interactive and it asked its participants to rate to what extent they agree or disagree with 5 statements.

Some of the main takeaways from this graph are that:

- A quarter of respondents did not believe in setting a minimum amount of time to recover from brain injuries - instead they felt that helmets and protective gear should be modified to better protect athletes.
- Additionally, nearly a quarter of respondents felt that risk of injury in football is widely known. So perhaps there is a consensus that the sport itself isn't going to change, but it is the responsibility of athletes to decide whether or not they will put themselves at risk. This statement in particular really stood out to me as tying back to my hypothesis that risk negatively affects participation.

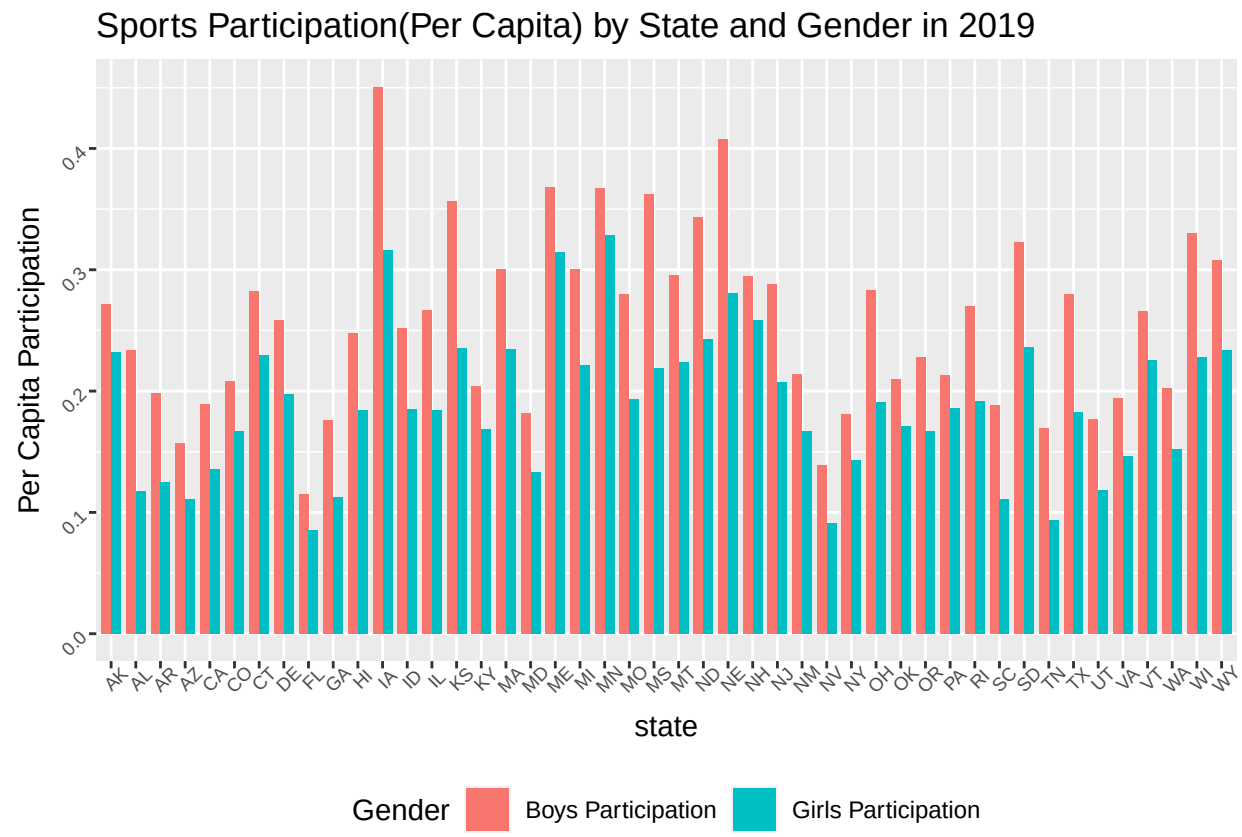
The Impact of Academics on Sports Participation

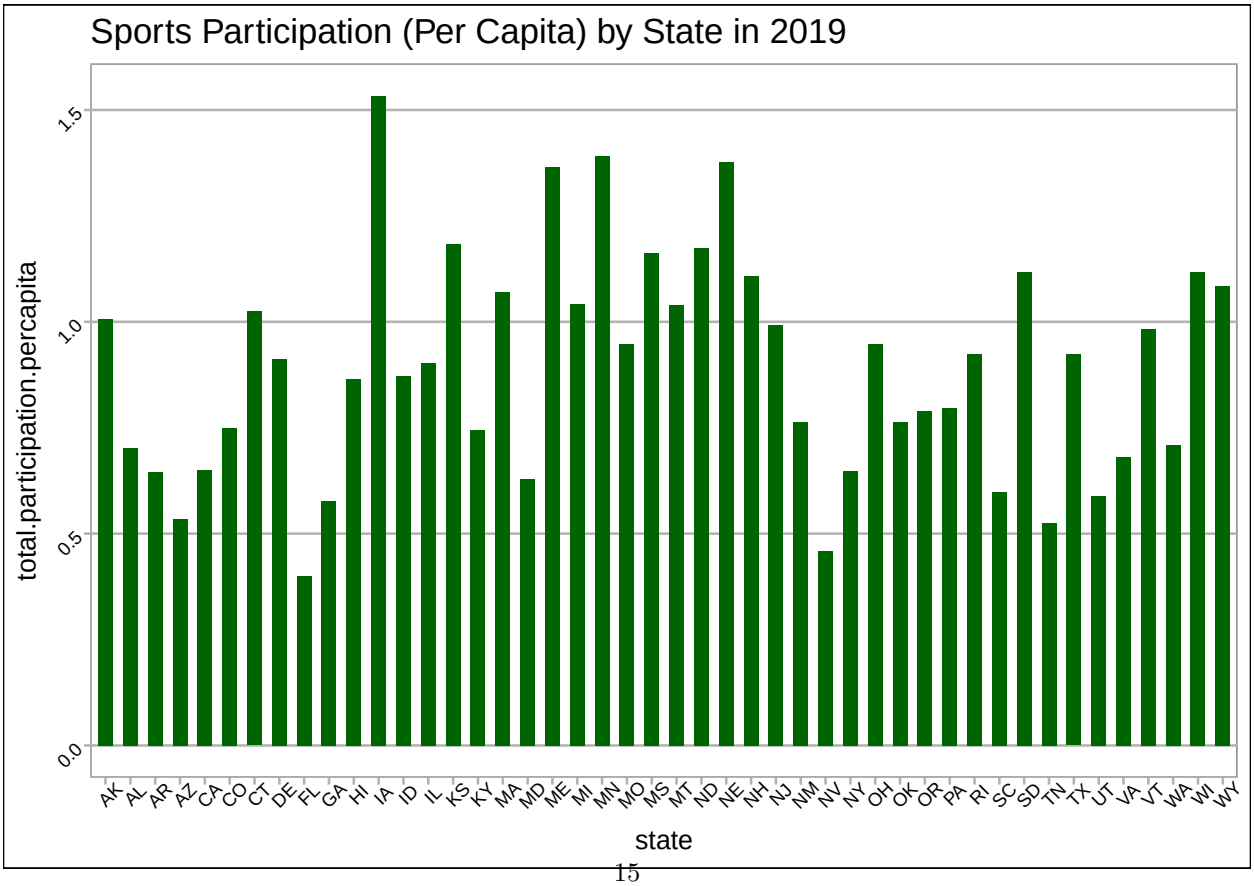
Joseph Bernardi

An essential part of our hypothesis is that an increased amount of focus on academics will lower the participation in sports, as students will have less time to devote to sports.

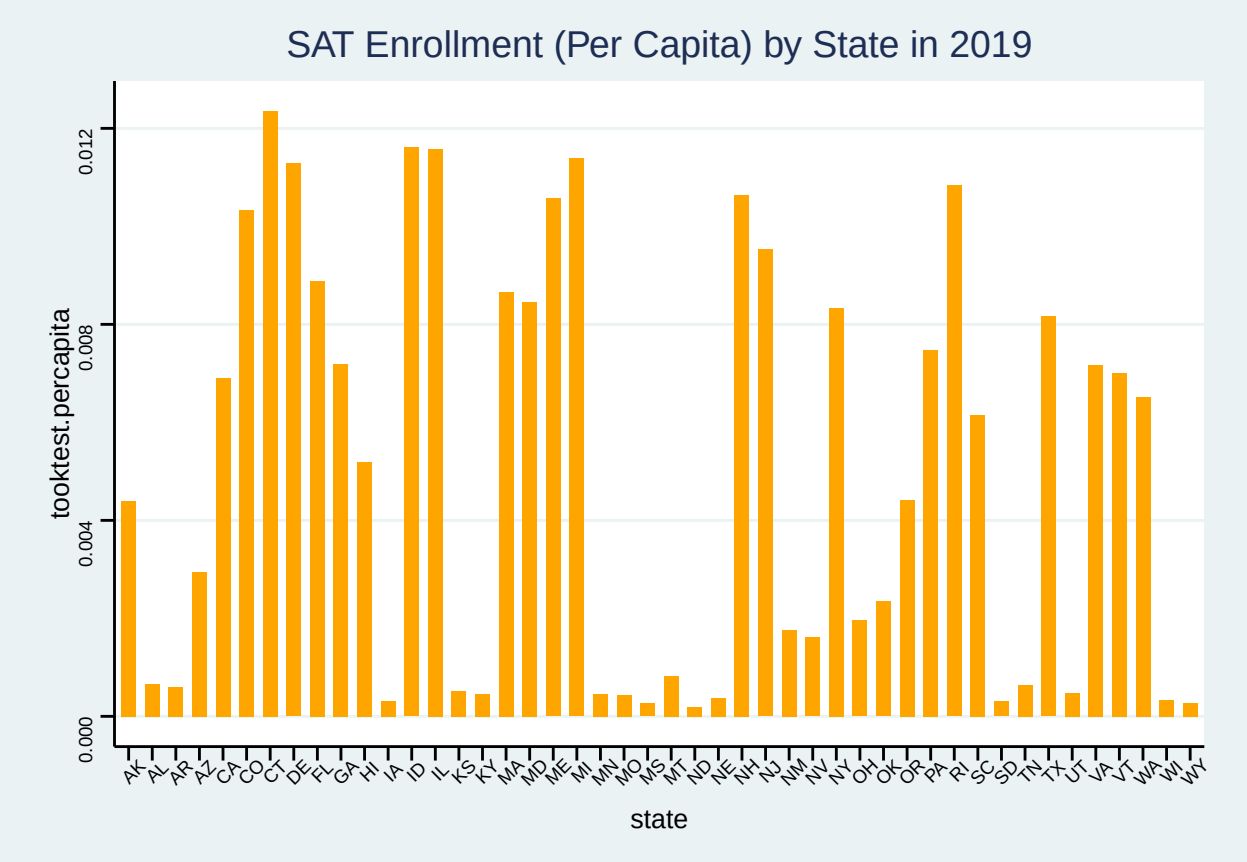
Initially, I tested AP enrollment against the participation in high school sports, but found no significant correlation. I concluded that this may be due to other variables such as the differing availability of AP programs at school. Therefore, I began to analyze the relationship between SAT enrollment (per capita) and average score, as well as boys and girls sports participation (per capita).

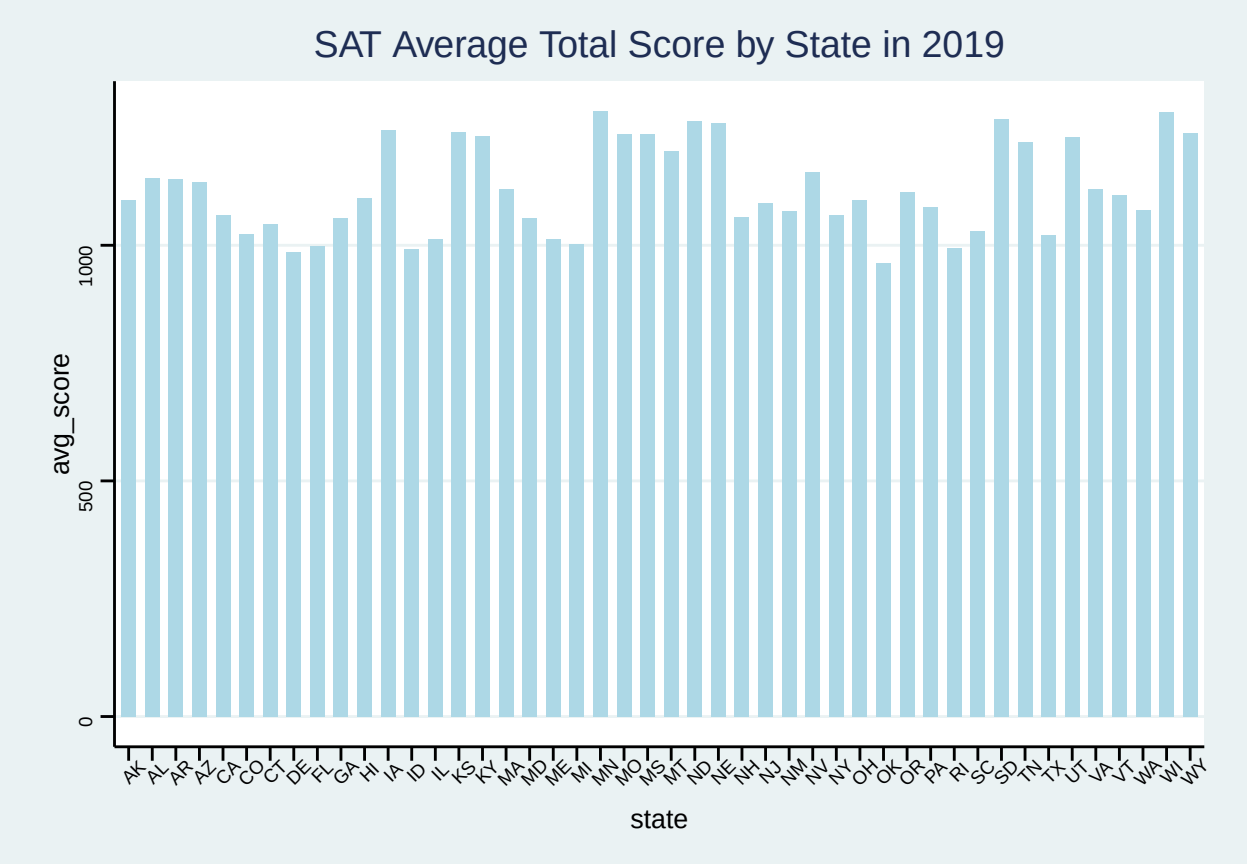
SAT Enrollment and Average Score





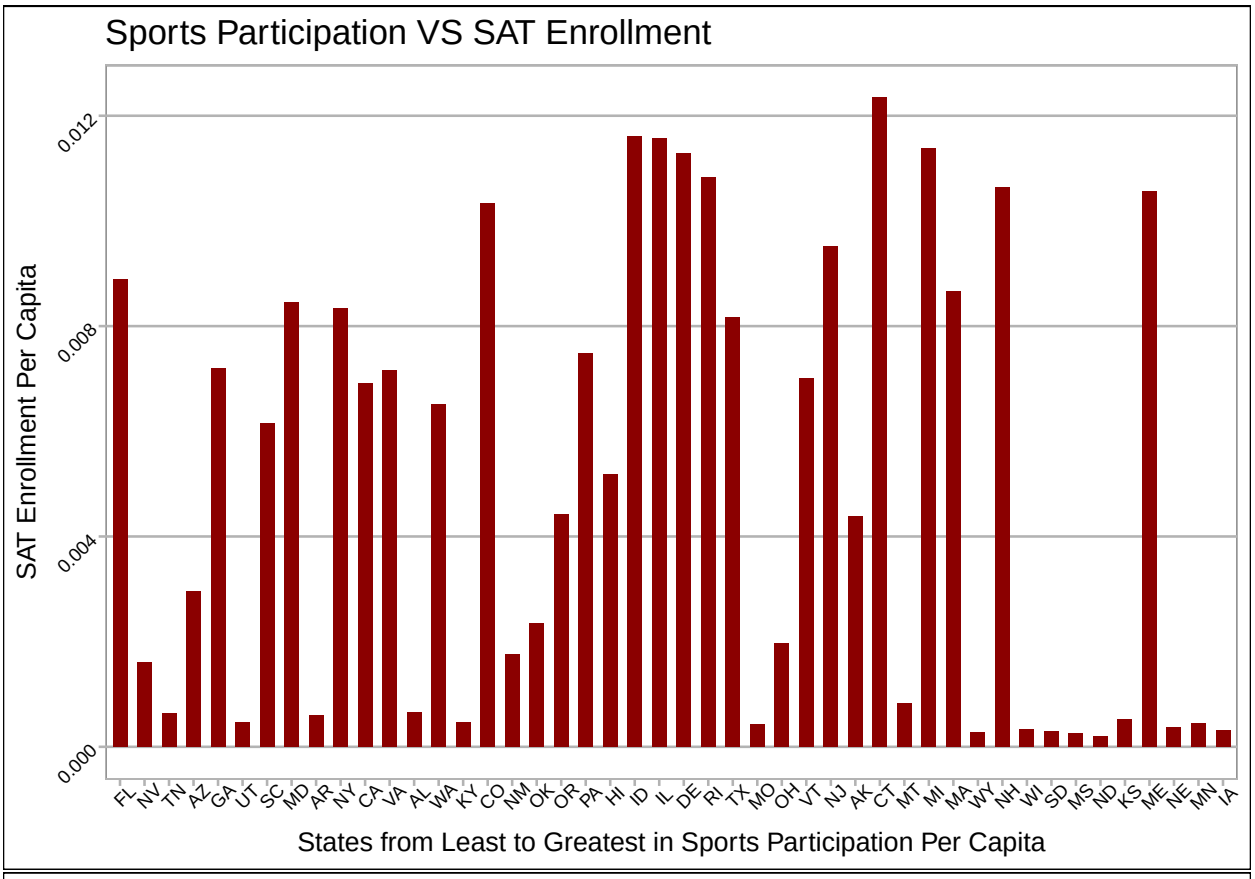
Here we can observe that different states have varying levels of participation when adjusting for population size. In general, boys tend to participate in sports more than girls. Iowa and Nebraska are among the highest for per capita participation. We can also observe similar trends when comparing total participation between states.

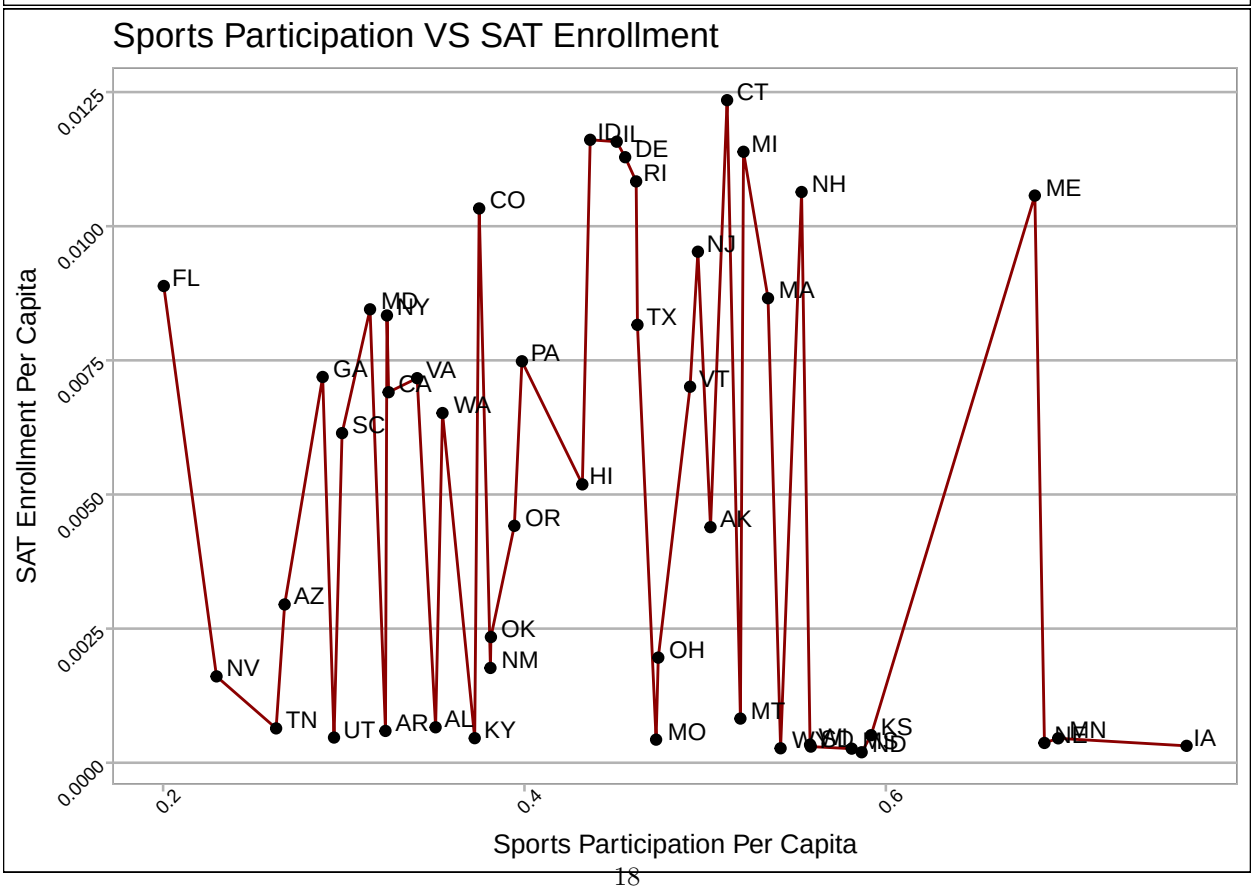




Here, for reference, we can observe the SAT enrollment per capita and average SAT score for each state in 2019.

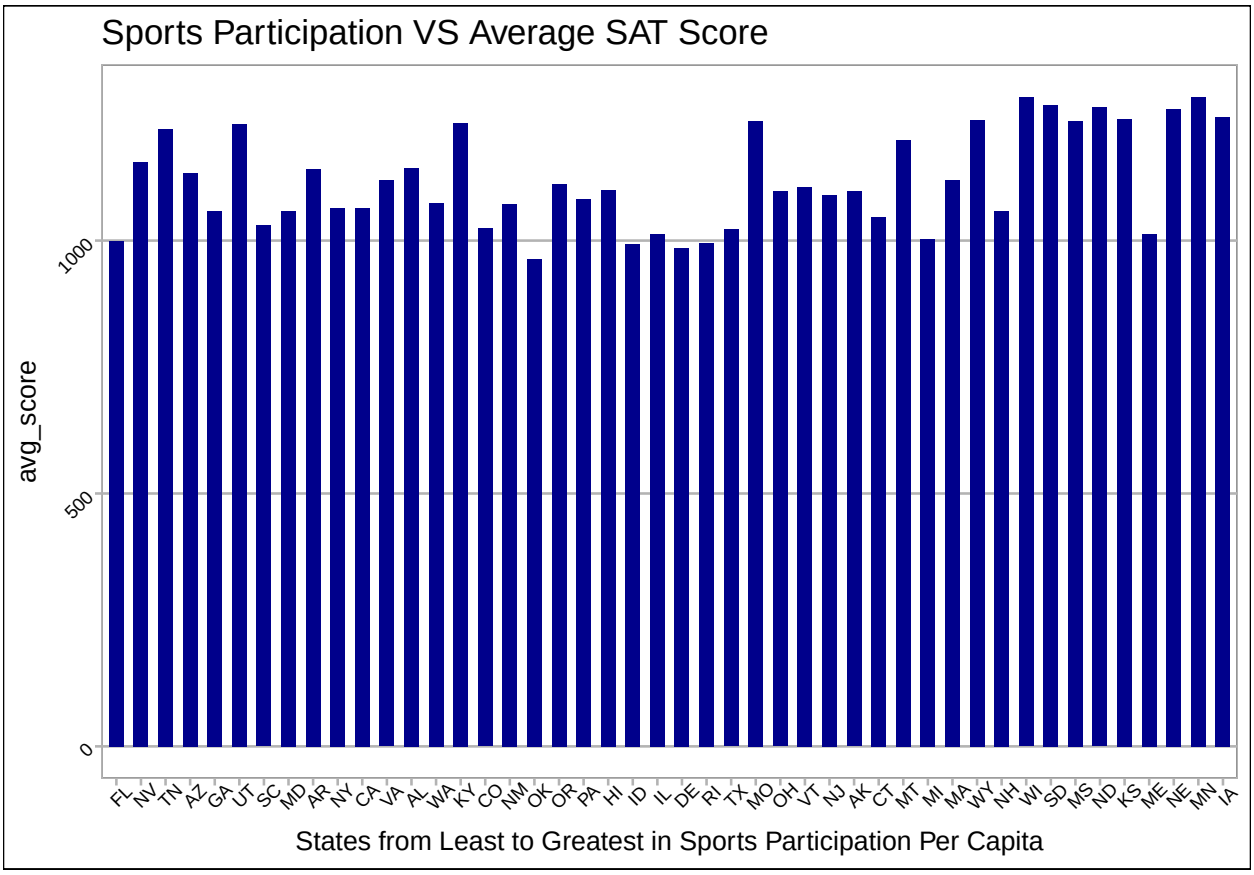
Comparing Sports Participation with SAT Enrollment and Average Score

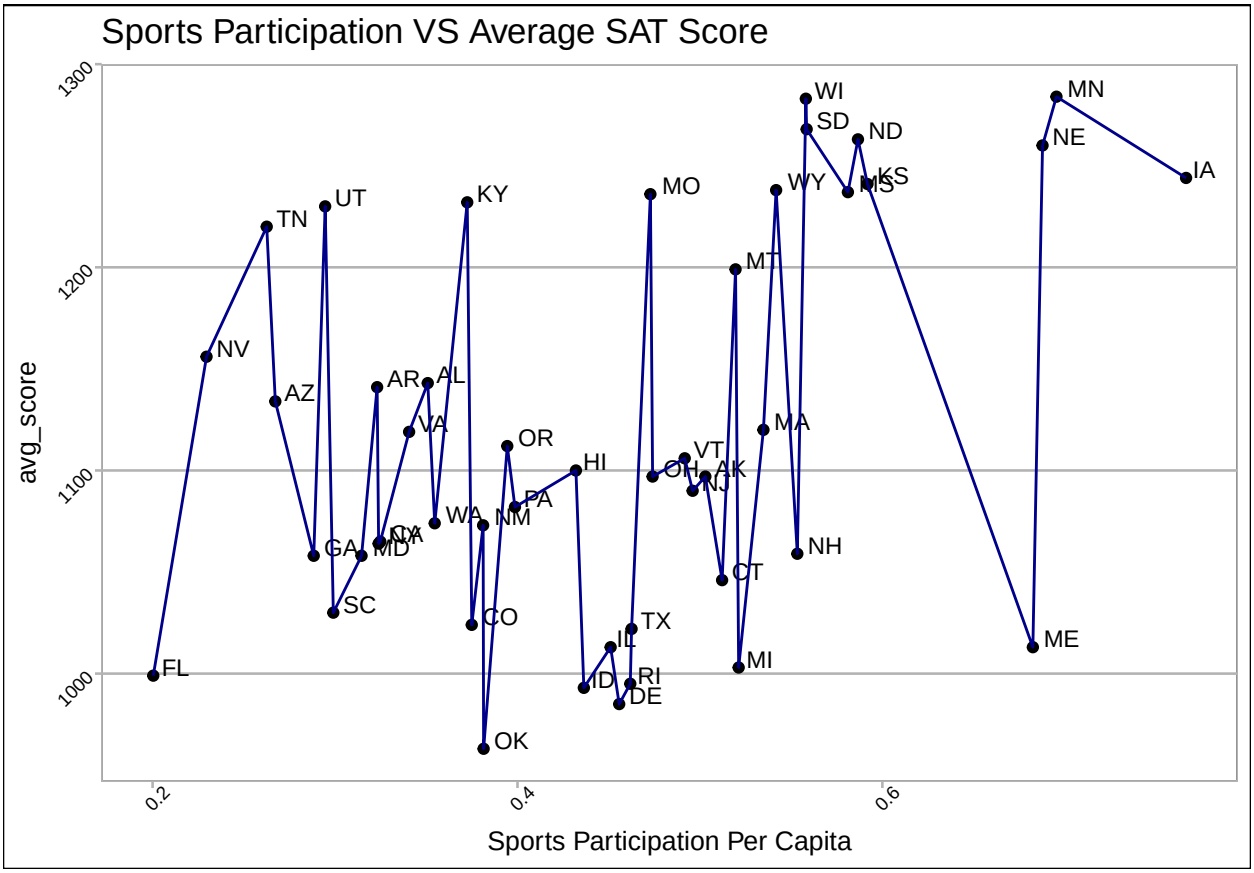




First, we can examine the relationship between sports participation per capita and SAT enrollment per capita. We can observe this relationship in a couple ways, the first of which is ordering the states from least to greatest in terms of sports participation, and plotting the enrollment per capita on a bar chart. Secondly, we may use a line plot to compare the two values, while portraying the states as point labels.

After examining both of these visualizations, it is apparent that there is no visible correlation between sports participation and SAT enrollment, as the data points are flat, and do not entail a positive or negative correlation.



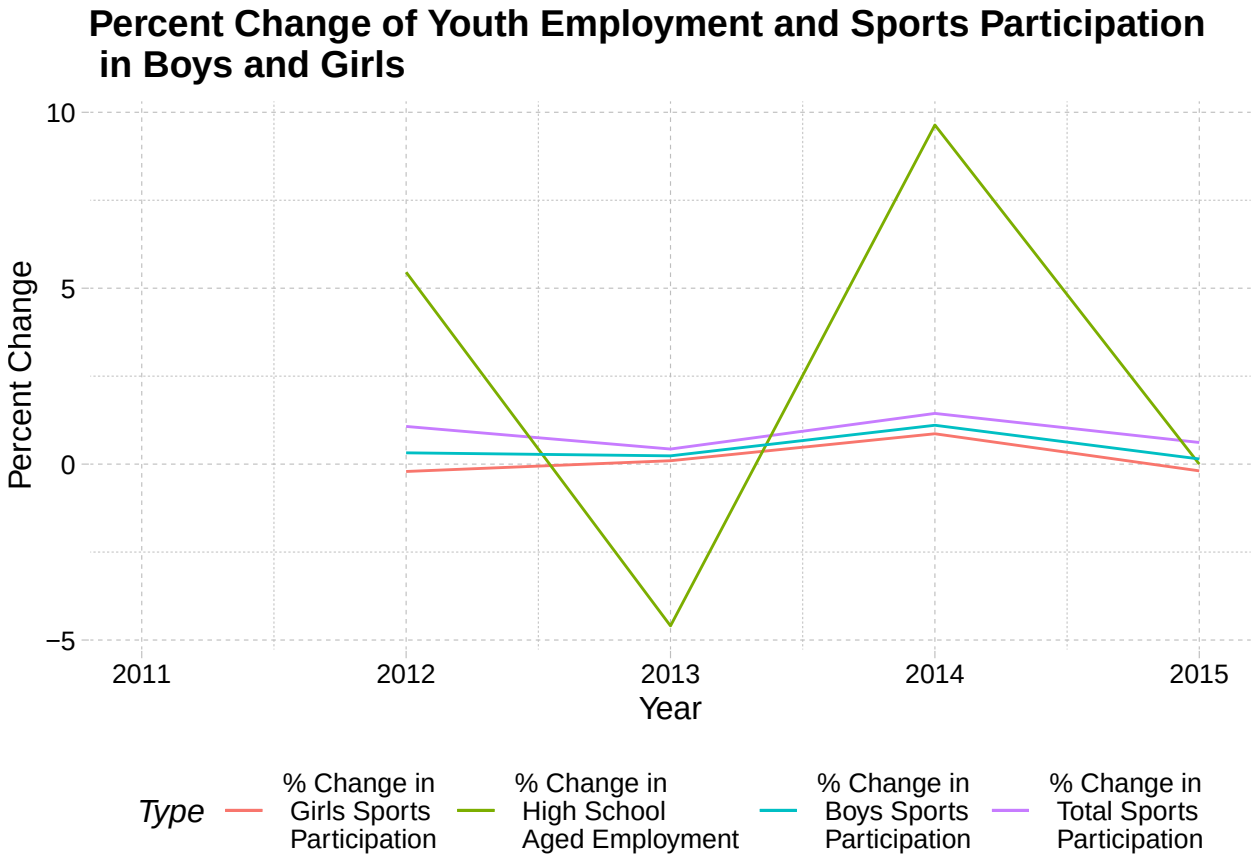


Similar visualization techniques can be used to examine the relationship between sports participation per capita and the average SAT score for each state. A similar conclusion can be inferred from these visualizations, in that there seems to be no visible correlation between the two variables. Neither plot infers a positive or negative correlation, as there is no clear trend in the data points.

In summary, the data distinctly portrays that there is no correlation between SAT enrollment/scores and participation in sports.

Comparing Sports Participation and Youth Employment in High School

Although our initial hypothesis has seemed to be refuted, let us expand a little bit on this concept of work. Lots of students work jobs after school, would this be more detrimental to sports participation?



Here, we can observe that there is a noticeable positive trend in the data, inferring there to be a positive relationship between sports participation and youth employment. This defies our expectation from our hypothesis, that an increase workload would explain less involvement in sports. However, it seems like this is the exact opposite. This may have an economic factor to it, in that when the economy is doing well, students' families will be able to do better financially and afford fees for extracurricular activities for their children and not need them to necessarily get a job.

To conclude, it is apparent that this section of our hypothesis has been proven to be incorrect, as SAT data shows a constant trend, while youth employment portrays the opposite of our expectations.