Comparing Risk Behaviors of Teens in America

**Common Core Standards:**

S.ID.2: Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

S.IC.1: Understand statistics as a process for making inferences about population parameters based on a random sample from that population.

S.IC.3: Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.

S.IC.6: Evaluate reports based on data.

**Mathematical Practice:**

#3 Construct viable arguments and critique the reasoning of others

# #4 Model with mathematics

# Lesson Objective:

# SWBAT use a survey from the CDC to compare the percents of students involved in risk behaviors in their state and comparable states.

# SWBAT discuss and defend their findings based on two different type graphs.

**Summary of Tasks / Actions:**

**(this activity may take one or two days depending on class time and length of discussions)**

* Have students read the abstract and the first paragraph of 3. Child Maltreatment and attachment of the article <http://www.researchgate.net/profile/Eldra_Solomon/publication/7262301_Biology_childhood_trauma_and_murder_rethinking_justice/links/00b4952ebb2f2506e4000000.pdf> . Discuss the difficulties of collecting data for this topic.
* Have students read and discuss the abstract from the Youth Risk Behavior Surveillance from the CDC. <http://www.cdc.gov/mmwr/pdf/ss/ss6304.pdf>
* Begin with the data from Table 2. Have students look over the data and discuss what categories are surveyed and which states have similarities to their own.
* Use Table 12 (or another table if you so choose) and discuss what information is contained on the table. Discuss the meaning of a 95% Confidence Interval.

Statisticians use a [confidence interval](http://stattrek.com/Help/Glossary.aspx?Target=Confidence%20interval) to describe the amount of uncertainty associated with a sample estimate of a population [parameter](http://stattrek.com/Help/Glossary.aspx?Target=Parameter).

## How to Interpret Confidence Intervals

Suppose that a 90% confidence interval states that the population mean is greater than 100 and less than 200. How would you interpret this statement?

Some people think this means there is a 90% chance that the population mean falls between 100 and 200. This is incorrect. Like any population [parameter](http://stattrek.com/Help/Glossary.aspx?Target=Parameter), the population mean is a constant, not a [random variable](http://stattrek.com/Help/Glossary.aspx?Target=Random%20variable). It does not change. The probability that a constant falls within any given range is always 0.00 or 1.00.

The [confidence level](http://stattrek.com/Help/Glossary.aspx?Target=confidence_level) describes the uncertainty associated with a sampling method. Suppose we used the same sampling method to select different samples and to compute a different interval estimate for each sample. Some interval estimates would include the true population parameter and some would not. A 90% confidence level means that we would expect 90% of the interval estimates to include the population parameter; A 95% confidence level means that 95% of the intervals would include the parameter; and so on.

 ( <http://stattrek.com/estimation/confidence-interval.aspx> )

* Use Risk Behaviors Worksheet #1 and the Risk Behavior Graph #1. Have students work in pairs or threes and complete the worksheet and graphs. (A Sample of the graphs have been provided)
* After students have completed their work: Have a class discussion on the questions and results of their findings. How did they pick their states? Are they geographically close? Is their selected state above or below the Median? Is it significantly different? How does their state compare to the others they chose?
* Use Risk Behavior Worksheet #2 and the Risk Behavior Box Plots. (A Sample of the graphs have been provided) (extra # lines have been provided if you want to do more than one table)
* After students have completed their work: Have a class discussion on the questions and result of their findings. Does the box plot change their answers from the first worksheet?

Materials Needed:

* Youth Risk Behavior Surveillance from the CDC. <http://www.cdc.gov/mmwr/pdf/ss/ss6304.pdf>
* Risk Behaviors Worksheet #1
* Risk Behavior Graph #1
* Risk Behavior Worksheet #2
* Risk Behavior Box Plots