**Ski to Sea: Which sport leg is most important?**

The Ski to Sea race is a multi-sport relay race held annually in Whatcom County, Washington. The race consists of seven legs in the order: cross-country skiing, downhill skiing or snowboarding, running, road biking, canoeing, mountain biking, and kayaking, with each leg representing a different outdoor sport. A team will consist of one person for each leg of the race, except for the canoe leg which has two paddlers per canoe. Racers are allowed to compete in multiple legs of the race. A team must have a minimum of three racers and a maximum of eight, with a maximum of three legs per individual. The canoe leg must have two participants regardless of the number or racers per team. The Ski to Sea Race does not allow individuals to complete all legs of the race.

Complete the following questions using the Ski\_to\_Sea\_Data.csv:

1. Using the data, make a correlation table and find the correlation between XC Biking and Overall time.

The correlation between XC Biking and Overall time is r=0.378.

1. Make a plot and report the relationship between the 2 variables.



There is a moderate/strong positive linear relationship between XC biking and overall time.

1. Between which leg and overall time is the correlation the weakest?

The running leg shows the weakest correlation with overall competition time at 0.015. This may indicate that it is easy for teams to succeed in the running leg and harder to find talent for the other legs.

1. Think about why this correlation may be the lowest.

It is probably easier to find talented runners that are relatively fast compared to the fastest runners in the race. The other legs probably have more difficulty finding highly talented racers so a leg with less volatility will be less correlated with a lower time.

1. In general, what is a better indicator of a team's success in the Ski to Sea race, their performance in the downhill skiing leg or the biking leg? Why do you think this?

The correlation between downhill skiing and overall time is r=0.439, while the correlation between the road bike leg and overall time is r=0.189. The downhill skiing leg is more correlated to overall time than the road biking leg so it is a better indicator of team success. It may be harder to gain time on the road biking leg because most people will bike at a similar speed, while the more skilled downhill skiers will gain lots of time on the less comfortable skiers.

1. Make a correlation table for only 2019 results. Which race leg demonstrates the strongest correlation with the overall finish time this year?

In 2019, the road bike leg exhibited the strongest correlation with r = -0.347.

1. How do the correlations for 2019 compare to the overall correlation table?

The correlations for 2019 tend to be negative and have smaller magnitudes than the overall correlation.

1. What leg is most correlated with overall time? Why might this leg have a stronger correlation?

The kayak leg shows the strongest correlation with the overall competition time, with a correlation coefficient of 0.464.