## Correlational Study

- Definition: examines RELATIONSHIPS between two variables
- Correlation DOES NOT PROVE causation!!!
- Correlational range from -1 to +1 (correlation coefficient).
- The number is the STRENGTH of the correlation!
- Positive (+) correlations mean that as one variable increases, so does the other
- Negative (-) correlations mean that as one variable increases, the other decreases
- Examples:
- Temperature and ice cream eaten (+)
- TV watched and grade performance (-)


## Types of Correlation

## Positive Correlation

- The variables go in the SAME direction.


Studying and grades hopefully has a positive correlation.

Heroin use and grades probably has a negative correlation.


- The variables go in opposite directions.


## Negative Correlation

## Correlation

## - Correlation Coefficient

- a statistical measure of the extent to which two factors vary together, and thus how well either factor predicts the other

> Indicates direction of relationship
> (positive or negative)

Correlation coefficient

Indicates strength of relationship
(0.00 to 1.00)

## Correlation

- Scatterplot
- a graphed cluster of dots, each of which represents the values of two variables
- the slope of the points suggests the direction of the relationship
- the amount of scatter suggests the strength of the correlation
- little scatter indicates high correlation
- also called a scattergram or scatter diagram


## Correlation



Perfect positive correlation (+1.00)


Perfect negative correlation (-1.00)

Scatterplots, showing patterns of correlations

## Correlation

## Height and Temperament of 20 Men

| Subject | Height in <br> Inches | Temperament | Subject | Height in <br> Inches | Temperament |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 80 | 75 | 11 | 64 | 48 |
| 2 | 63 | 66 | 12 | 76 | 69 |
| 3 | 61 | 60 | 13 | 71 | 72 |
| 4 | 79 | 90 | 14 | 66 | 57 |
| 5 | 74 | 60 | 15 | 73 | 63 |
| 6 | 69 | 42 | 16 | 70 | 75 |
| 7 | 62 | 42 | 17 | 63 | 30 |
| 8 | 75 | 60 | 18 | 71 | 57 |
| 9 | 77 | 81 | 19 | 68 | 84 |
| 10 | 60 | 39 | 20 | 70 | 39 |

## Correlation



Scatterplot of Height and Temperament

## Correlation

Three Possible Cause-Effect Relationships


## Statistical Reasoning

- Mode
- the most frequently occurring score in a distribution
- Mean
- the arithmetic average of a distribution
- obtained by adding the scores and then dividing by the number of scores
- Could easily be thrown off by a couple of outliers
- Median
- the middle score in a distribution
- half the scores are above it and half are below it


## Statistical Reasoning

## A Skewed Distribution



One Family
Income per family in thousands of dollars

## Statistical Reasoning

- Range
- the difference between the highest and lowest scores in a distribution
- Standard Deviation
- a computed measure of how much scores vary around the mean

