

## TOPIC: EVALUATING RESEARCH FINDINGS

### Descriptive Statistics – Measures of Central Tendency

◆ **Descriptive Statistics:** Statistics that \_\_\_\_\_ data. Two main types:

1. **Measures of Central Tendency:** Which values are most \_\_\_\_\_.
2. **Measures of Variability:** How much individual responses \_\_\_\_\_.

#### 1. Measures of Central Tendency

	Mean	Median	Mode
<b>Definition</b>	The _____ value.	The _____ value.	The most _____ (frequent) value.
<b>How to Calculate</b>	Add up values and divide by the number of values.	Put values in numerical order and find middle value.	Count how often each value occurs.
<b>Dataset</b> <b>IQ Scores</b> <b>(n = 7)</b> 85 115 85 95 90 130 135	<b>Mean</b> : _____  <b>Median</b> : _____  <b>Mode</b> : _____		
<b>Keep in Mind...</b>	Easily skewed by <b>outliers</b> ('unusual' numbers in data).	Very useful when dataset has _____.	Some datasets will have _____ mode or multiple modes!

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### EXAMPLE

Calculate the mean, median, and mode of the following dataset. Then, fill in the blanks: In this dataset, the \_\_\_\_\_ is not as useful because it is skewed by an \_\_\_\_\_.

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**Dataset**

300,000  
325,000  
1,500,000  
275,000  
425,000  
350,000  
325,000

Mean: \_\_\_\_\_

Median: \_\_\_\_\_

Mode: \_\_\_\_\_

### PRACTICE

Desmond is a graduate student who does a lot of work with household income data, and his samples almost always have outliers. Which measure of central tendency might be the most useful for Desmond to use?

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- a) Mean.
- b) Median.
- c) Mode.
- d) Range.

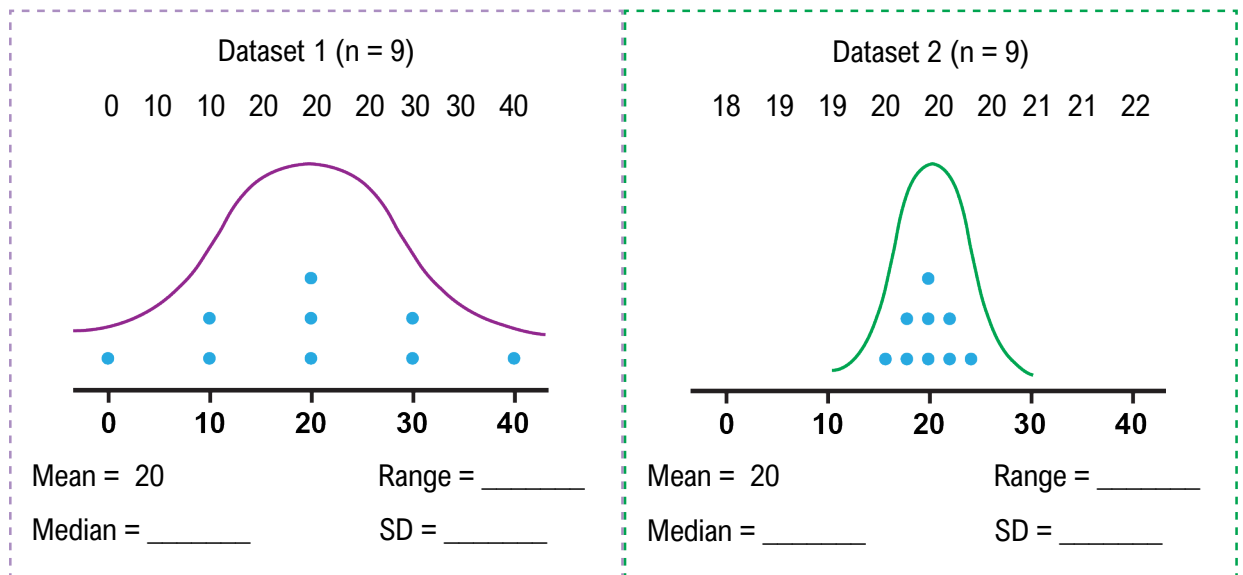
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**Descriptive Statistics – Measures of Variability**

◆ Variability gives us a sense of how our data is \_\_\_\_\_ out. Two main measures:

**2. Measures of Variability**

	Range	Standard Deviation
<b>Definition</b>	The difference between the highest and _____ values in the data.	Indicates the average distance that each datapoint is from the _____.



**EXAMPLE**

Below are two datasets. Compare them, and then choose the answer that best describes the data.

<b>Dataset 1</b>
7 5 10 8 6

<b>Dataset 2</b>
5 18 27 1 10

- a) Dataset 1 has greater variability.
- b) Dataset 2 has greater variability.
- c) These datasets have the same amount of variability.
- d) There is not enough information given to assess the variability of these datasets.

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**PRACTICE**

Calculate the range of the following dataset: 22, 28, 31, 25, 42, 30.

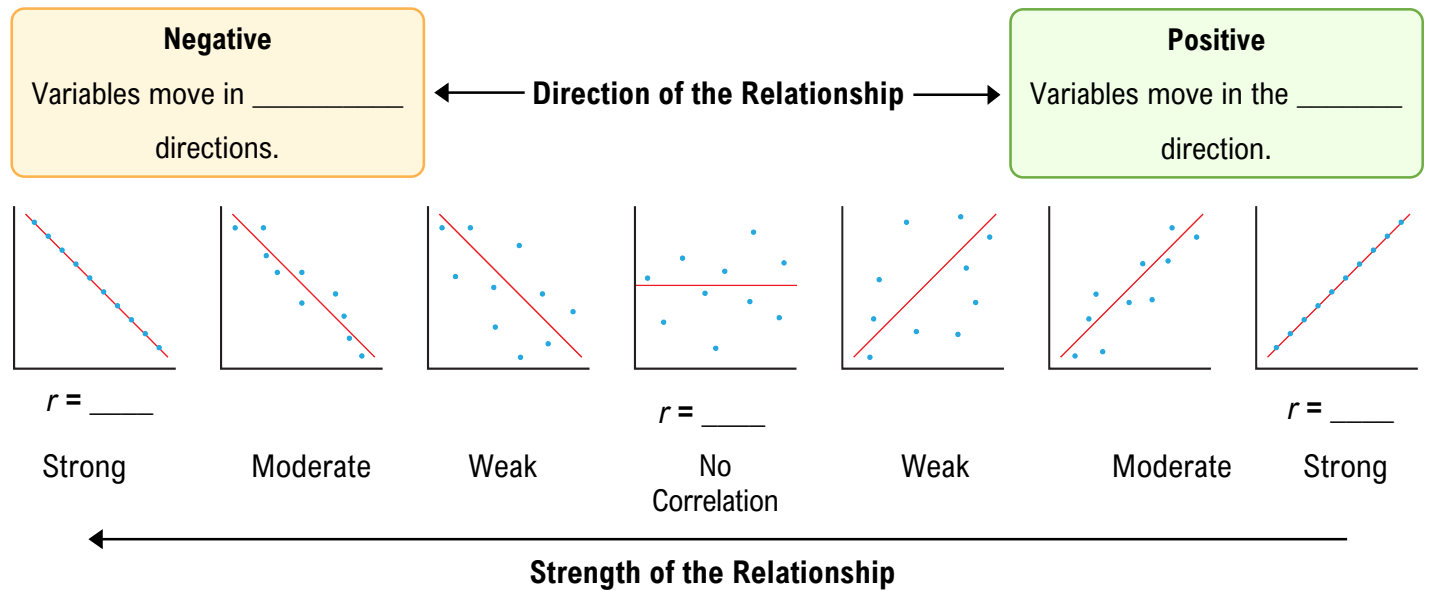
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- a) 17
- b) 20
- c) 12
- d) 14

## TOPIC: EVALUATING RESEARCH FINDINGS

### Correlations

◆ **Correlation:** Measure of the direction and strength of a relationship, quantified with a **correlation coefficient** ( $r$ ).



There is no standard for what is considered a “strong,” “moderate,” or “weak” correlation. It differs among fields and topics of study. So don’t worry if you notice inconsistent descriptions as you begin to read research.

### EXAMPLE

Dr. Goldberg is examining the relationship between caffeine consumption and IQ. His data shows a correlation coefficient of  $r = .02$ . Which of the following statements provides the **BEST** description of this data?

- a) Caffeine consumption and IQ have a strong positive correlation.
- b) There appears to be almost no relationship between caffeine consumption and IQ.
- c) There appears to be a moderate negative relationship between caffeine consumption and IQ.
- d) Caffeine consumption and IQ are negatively correlated.

### PRACTICE

Which of the following correlation coefficients indicates the **strongest** relationship between two variables?

- a)  $r = + .25$
- b)  $r = + .55$
- c)  $r = - .10$
- d)  $r = - .65$

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### Correlation Does Not Equal Causation

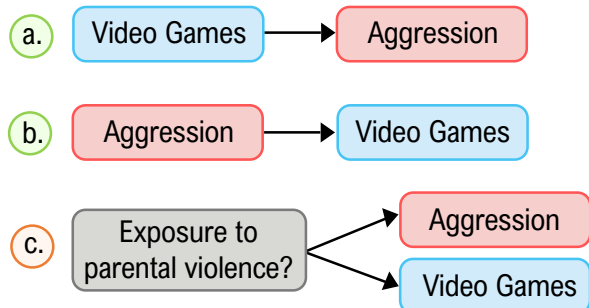
◆ There are two main reasons to keep this in mind:

1. Lack of \_\_\_\_\_ precedence.
2. **Third-Variable Problem:** A correlation between two variables is actually explained by a \_\_\_\_\_ variable.

◆ Ex: Some research shows that playing violent video games is correlated with aggressive behavior in children.



#### Possible Explanations



### EXAMPLE

Dr. Florence recently conducted a study and found that ice-cream sales and crime are positively correlated ( $r = .78$ ).

Write out three *possible* explanations for these findings, and state which explanation is the most likely.



1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

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### **PRACTICE**

What does the third-variable problem refer to in correlational research?

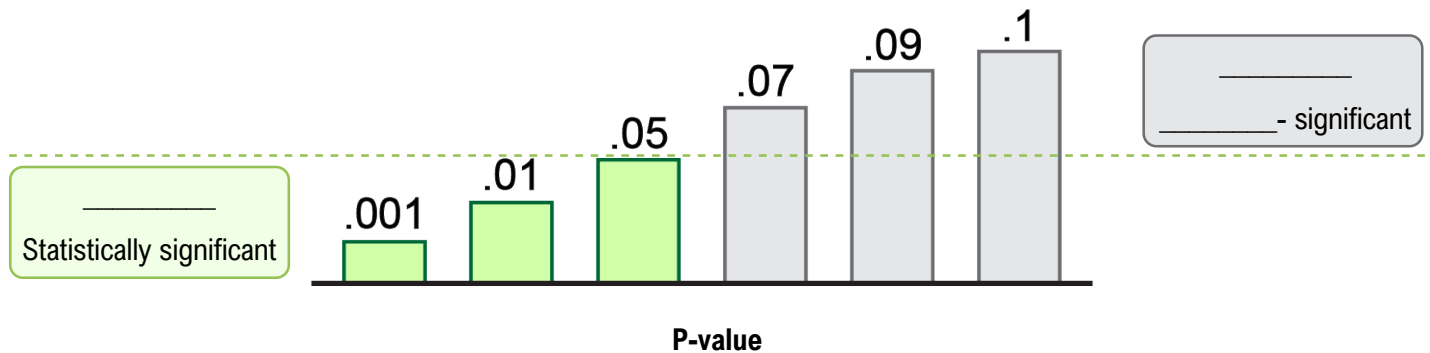
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- a) The presence of an unmeasured variable that may influence both variables being studied.
- b) When you examine more than three variables, correlational research becomes unreliable.
- c) The difficulty in determining if a correlation is positive or negative.
- d) A common error that can occur in correlational research when a sample size is too small.

## TOPIC: EVALUATING RESEARCH FINDINGS

### Inferential Statistics

- ◆ Used to draw conclusions about how statistically \_\_\_\_\_ a study's results are.
- ◆ Show the probability of getting the \_\_\_\_\_ results if there was \_\_\_\_\_ relationship between the variables.
- ◆ If the probability of the event *happening by chance* is less than \_\_\_\_\_ we consider it **statistically significant**.



### EXAMPLE

Read through the following example. Interpret the results and fill in the blanks.

**Hypothesis:** New drug, *PillXP*, will be more effective at reducing anxiety and depression symptoms than a placebo.

**Design:** Experimental Group A takes *PillXP* for one week. Group B receives a placebo for one week. Data on anxiety and depression symptoms are collected at the end of the trial.

#### Results:

	Group A	Group B	$p$
Anxiety Score	M=12	M=26	.05*
Depression Score	M=20	M=21	.11

**Interpretation:** Group \_\_\_\_\_ had a statistically significant reduction in anxiety symptoms compared to Group \_\_\_\_\_.

This study did \_\_\_\_\_ find evidence of a significant effect with regard to depression scores.

### PRACTICE

Which of the following “p values” would indicate that a statistically significant relationship was found between two variables?

- $p < .01$
- $p < .05$
- $p < .09$
- Both a and b