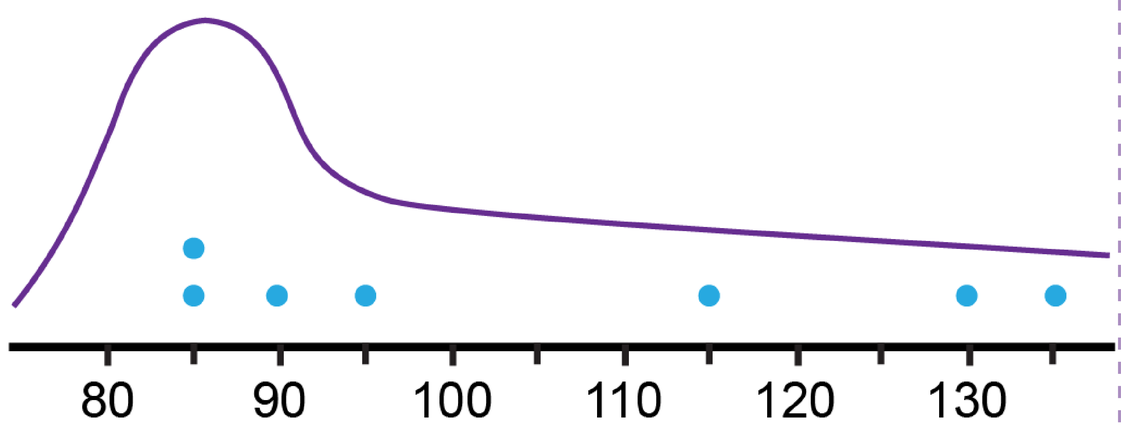
TOPIC: EVALUATING RESEARCH FINDINGS

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
Definition	The _____ value.	The _____ value.	The most _____ (frequent) value.
How to Calculate	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.
Dataset **IQ Scores** **(n = 7)** 85 115 85 95 90 130 135	**Mean** : _____ **Median** : _____ **Mode** : _____		
Keep in Mind…	Easily skewed by **outliers** ('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 _____.

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?

a) Mean.

b) Median.

c) Mode.

d) Range.

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Descriptive Statistics – Measures of Variability

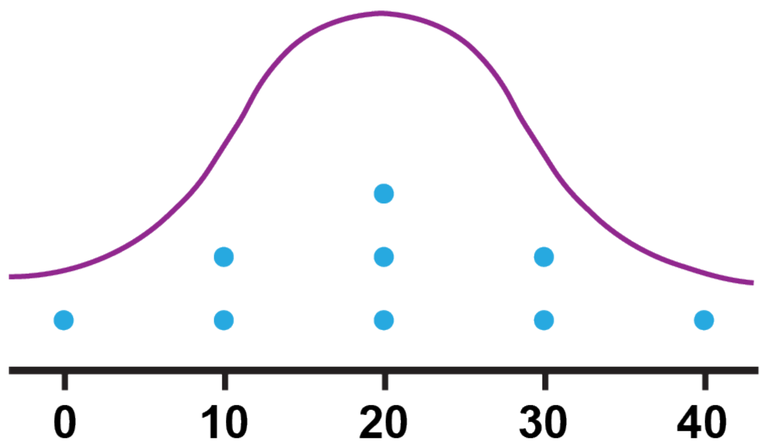
◆ Variability gives us a sense of how our data is _____ out. Two main measures:

2. Measures of Variability

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

Dataset 1 (n = 9)

0 10 10 20 20 20 30 30 40

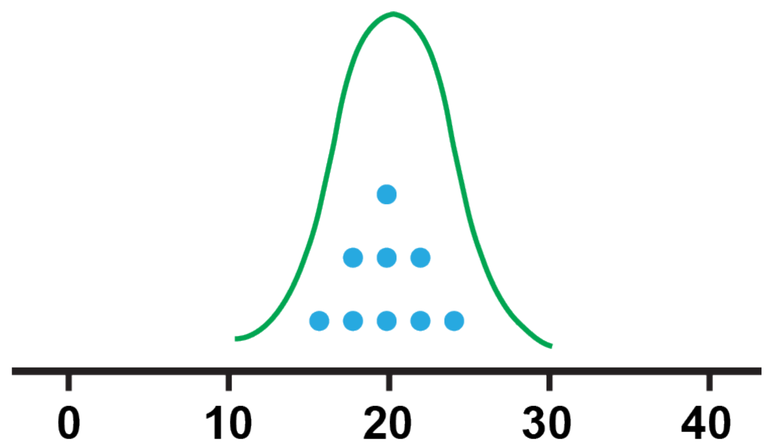


Mean = 20 Range = _____

Median = _____ SD = _____

Dataset 2 (n = 9)

18 19 19 20 20 20 21 21 22



Mean = 20 Range = _____

Median = _____ SD = _____

EXAMPLE

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

Dataset 1

7 5 10 8 6

Dataset 2

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

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Correlations

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

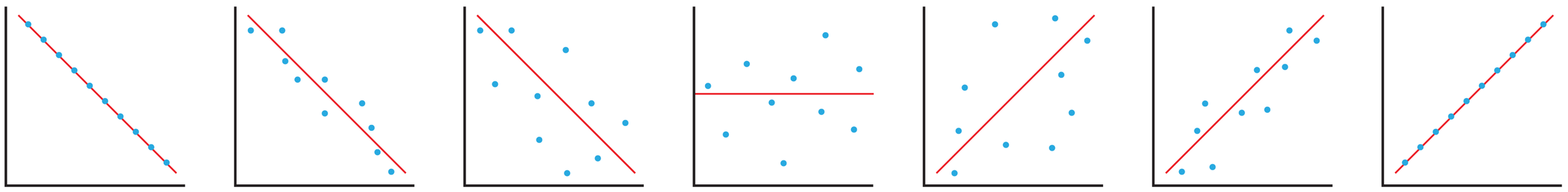
Negative

Variables move in _____ directions.

⟵ **Direction of the Relationship** ⟶

Positive

Variables move in the _____ direction.



r = ____ *r* = ____ *r* = ____

Strong | Moderate | Weak | No Correlation | Weak | Moderate | Strong

Strength of the Relationship

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

a. Video Games → Aggression

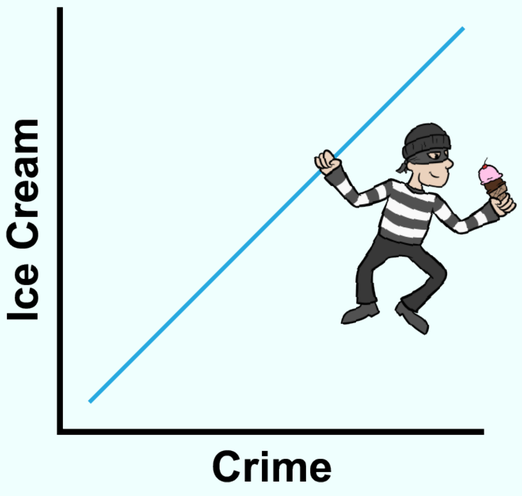
b. Aggression → Video Games

c. Exposure to parental violence? → Aggression; Video Games

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.

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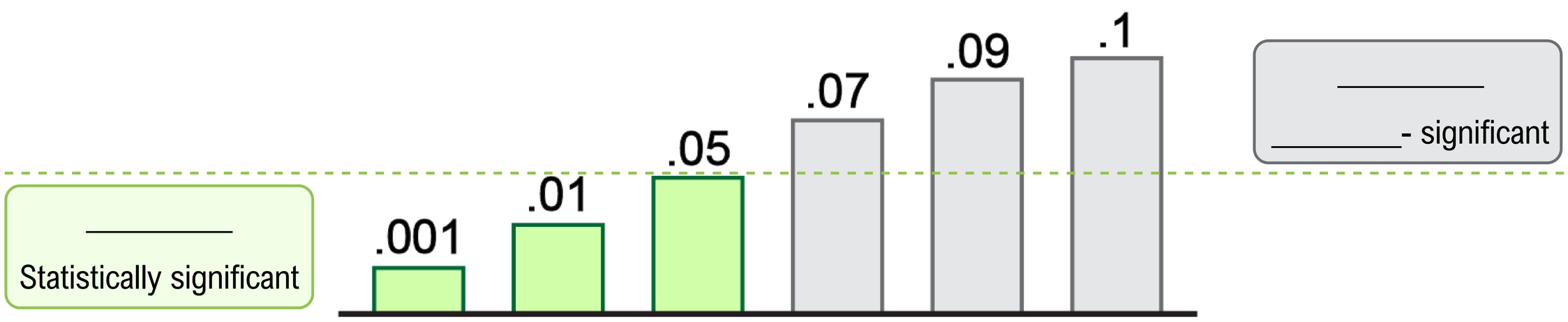
Inferential Statistics

- 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.**



P-value

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?

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a) $p < .01$

b) $p < .05$

c) $p < .09$

d) Both a and b