Research Methodologies

What is Psychology?

Psychology = study of behavior and mental processes - Not explicitly limited to humans; can be any cognitively advanced organism

Goals of Psychology - Describe - Explain - Predict - Control

Scientific Method 1. Come up with a **testable** question - Must be testable – if it isn't, it's not science - Come up with a hypothesis = an assertion about a phenomenon 2. Design a study - Study must collect data to analyze - Data should prove or dispove hypothesis 3. Analyze data - Conclusions come from this analysis 4. Report Results - Publication in a journal

Theory vs Hypothesis - **Theory** = a set of well-supported hypotheses that explain a phenomenon - **Hypothesis** = an assertion about a particular aspect of a phenomenon * Can be rejected or accepted

Operational Definition - An explicit, well-defined expounding of the procedures in an experiment - Important for studies to be repeatable

Replication - a re-do of a study to retest the hypothesis or account for variables not accounted for by the original study

Types of studies

Case Study - An in-depth study of the details of one particular subject - Hopefully, findings for the one can be generalized to the population - Advantages: * A lot of information/data to study - Disadvantages: * Conclusions cannot necessarily be generalized to others

Survey - A collection of self-reported data from individuals - Random sampling is very important - Wording Effect * The wording of questions can drastically change the responses - False Consensus Effect * A human tendency to overestimate the extent to which people agree with them - **Population** = all the members in a group * Different from **samples**, which are the sub-groups that are derived from the population - Sampling * Randomly select members of a population and assign them to samples * Protects against selection bias * Helps to make data more process-able - Advantages: - Easy way to get a lot of data - Disadvantages: - Very hard to get random sampling correct - Need people to be honest

Naturalistic Observation - Record and observe from a distance, without knowledge of the participents - Advantages: * Natural behavior = no behavioral bias - Disadvantages: * No direct communication with participents

Experiment - Searching for a causation between two variables - "Randomized Controlled Trial" - Placebo * A method to help prevent placebo affect from

tampering with results - Double-Blind Procedure * Participents shouldn't know whether they are in experimental or control group * Helps to prevent placebo affect from being different between the two groups - Advantages: * Demonstrates causation - Disadvantages: * Very difficult to prove causation

Correlations - A relationship between two variables - Does NOT imply a causal relationship - **Correlation Coefficient(r)** = measure of how strong/consistent the correlation is * Ranges between -1 and 1 - Type 1 Error: * You think there's a relationship, but there isn't * $false\ positive$ - Type 2 Error: * There is a relationship, but you think there isn't * $false\ negative$

Ethics of Psychology

- 1. Do no harm.
- 2. Accurately describe risks to potential subjects.
- 3. Ensure that participation is voluntary.
- 4. Minimize any discomfort to participants.
- 5. Maintain confidentiality.
- 6. Do not unnecessarily invade privacy.
- 7. Remove any misconceptions caused by deception (debrief).
- 8. Provide results and interpretations to participants.
- 9. Treat participants with dignity and respect.

Distributions

Percentile Ranking - the percentage of scores that are below yours

Bar Graphs - Also referred to as "historgram"

 $\mathbf{Mode} = \mathbf{the}$ most frequent element in a set of data - Any dataset a can have multiple modes

Mean - defined as
$$\frac{\sum_{i=1}^{n} E_i}{n}$$

 $\bf Median$ - Middle element * If two middles, average the two - Half of elements are above; half are below

Range - Defined as $E_{max} - E_{min}$

Standard Deviation - Metric of how much the elements vary from mean

Statistical Significance - An arbitrary error bound for determining whether or not a correlation is strong enough to publish

Distribution Skewing

Positive Skewed Distribution - High extremes - Average moves to right

Negatively Skewed Distribution - Low extremes - Average moves to left