

Research

Psychological Science

Research Methods

Ethics

Statistics

Psychological Science

- Critical Thinking
- Theory
- Hypothesis
- Operational Definitions
- Replication

Psychological Science

- **Critical Thinking**
 - Thinking that does not blindly accept arguments and conclusions
 - Examines assumptions and evaluates evidence to develop valid conclusions

Psychological Science

- **Theory**
 - Integrated set of principles that explains, organizes, and predicts behaviors or events

Psychological Science

- **Hypothesis**

- Testable prediction of the relationship between variables
- Must be falsifiable

Psychological Science

- **Operational Definitions**
 - Statements about the procedures or operations used to define research variables

Psychological Science

- **Replication**

- Repeating a research study
- Often uses different participants in different situations to see if the basic findings extend to different people and circumstances

Research Methods

- Naturalistic Observation
- Case Study
- Survey
- Correlational Study
- Longitudinal Study
- Cross-Sectional Study
- Experiment
- Quasi-Experiment

Research Methods

- **Naturalistic Observation**

- Observing and recording behavior in naturally occurring situations without manipulating or controlling the situation
- Overt or Covert

Research Methods

- **Naturalistic Observation**

- Advantages:

- Allows us to describe behavior
 - We can examine behaviors that are more typical/normal because they are not manipulated
 - Can provide data that assists in further research (ideas for hypotheses, correlational data)
 - Results are widely generalizable

- Disadvantages:

- Cannot explain behavior/no cause & effect conclusions

Research Methods

- **Case Study**

- Observation technique in which one person is studied in depth in order to reveal universal principles
- Can also apply to a group of people studied as one entity or community

Research Methods

- **Case Study**

- Advantages:

- Information is in-depth and detailed
 - Provides an opportunity to study unusual cases
 - Can provide ideas for hypotheses and further research
 - Could be more ethical if topic studied cannot be ethically studied with an experiment

Research Methods

- **Case Study**

- Disadvantages:

- Cannot show cause & effect
 - May not be able to generalize conclusions because sample size is so small or the person might not be typical
 - Inaccurate reporting of information could bias results
 - Could be costly or time-consuming to collect data

Research Methods

- **Survey**

- Using questionnaires administered to a random sample in order to ascertain the self-reported attitudes or behaviors of a group
- Could be administered verbally or as a paper questionnaire
- False Consensus Effect: tendency for a person to think his/her own views are representative of a general consensus

Research Methods

- **Survey**

- Population: all the cases in a group being studied, from which samples may be drawn
- Sample: subset of the population
- Random Sample/Random Selection: sample that fairly represents a population because each member has an equal chance of inclusion

Research Methods

- **Survey**

- Advantages:

- Quick and easy to administer & analyze
 - Provides information on many individuals

Research Methods

- **Survey**

- Disadvantages:

- Wording effects can influence responses given
 - Survey questions can be superficial, and there is no follow-up to expand on/explain survey answers
 - Nonresponse Bias: individuals who choose to respond to a survey are different from individuals who choose not to
 - Social Desirability Bias: tendency of respondents to reply in a manner that will be viewed favorably by others

Research Methods

- **Correlational Study**

- Study which measures the extent to which two factors are related to each other and how well one factor predicts the other
- Correlation Coefficient: statistical index of the relationship between two things (from -1 to 1)
- Scatterplot: graphed cluster of dots representing values of two variables
 - slope suggests the direction of the relationship between the two variables
 - amount of scatter suggests the correlation strength

Research Methods

- **Correlational Study**

- Advantages:

- Enables predictions
 - Can be time-efficient and inexpensive, especially if using previously collected survey data
 - Can be used to dispel illusory correlations
 - Can be more ethical than experiments studying the same topics

Research Methods

- **Correlational Study**

- Disadvantages:

- Cannot show cause & effect because direction of relationship is unknown
 - Cannot assess the impact of other factors (third variables, lurking variables)
 - Illusory correlations could give the impression of a relationship where none exists

Research Methods

- **Longitudinal Study**
 - Research method in which the same people are restudied and retested over a long period of time

Research Methods

- **Longitudinal Study**

- Advantages:

- differences observed in people are less likely to be the result of cultural differences across generations (compared with cross-sectional studies)

- Disadvantages:

- Cannot infer cause & effect
 - Participants who drop out can skew results
 - Very time-consuming
 - Can be costly

Research Methods

- **Cross-Sectional Study**
 - research method that involves observation of people of different ages in order to compare them

Research Methods

- **Cross-Sectional Study**
 - Advantages:
 - Not time-consuming like longitudinal study
 - Disadvantages:
 - Cannot establish cause & effect
 - Differences in age groups could also be a result of cultural differences between generations

Research Methods

- **Experiment**

- Research method in which an investigator manipulates one or more factors to observe the effect on some behavior or mental process
- Laboratory Experiment: experiment done in an environment controlled by the researcher
- Field Experiment: experiment done in a natural setting

Research Methods

- **Experiment**

- Independent Variable: experimental factor that is manipulated; the variable whose effect is studied; the treatment
- Dependent Variable: the outcome factor; that variable that may change in response to manipulations of the independent variable

Research Methods

- **Experiment**

- Experimental Condition/Group: in an experiment, the group that is exposed to the treatment or the independent variable
- Control Condition/Group: in an experiment, the group that is NOT exposed to the treatment; serves as a comparison against the experimental group to evaluate the effect of the treatment

Research Methods

- **Experiment**

- Confounding Variables: factor other than the independent variable which may cause a change in the dependent variable

- Experimenter Bias/Experimenter Expectancy
Effect: researcher's expectations or preferences about an outcome of a study influence the results
 - Participant Bias/Demand Characteristics:
participants may act in ways they believe the researcher is looking for and so not naturally

Research Methods

- **Experiment**

- Confounding Variables

- Placebo: a substance or condition a participant accepts as medicine or therapy, but which has no specific therapeutic activity
 - Placebo Effect: experimental results caused by expectations alone
 - Hawthorne Effect: tendency of research subjects to act atypically as a result of their awareness of being studied, as opposed to any actual treatment that has occurred

Research Methods

- **Experiment**

- Eliminating Confounding Variables

- Single-Blind Procedure: research design in which the participants don't know which group (experimental or control) they are in
 - Double-Blind Procedure: research design in which neither the experimenter nor the participants know who is in which group
 - Random Assignment: division of the sample into groups so that each individual has an equal chance of being put into the experimental or control conditions

Research Methods

- **Experiment**

- Between-Subjects Design: participants in the experimental group and the control group are different individuals
- Within-Subjects Design: each participant in an experiment acts as his own control comparison

Research Methods

- **Experiment (Laboratory)**

- Advantages:

- Very clear evidence for cause & effect relationship

- Disadvantages:

- Some lab experiments can be so contrived/unnatural, that findings aren't as easy to generalize outside of that situation
 - Can be difficult to control all variables

Research Methods

- **Experiment (Field)**

- Advantages:

- Can find cause & effect relationships
 - Able to generalize results because behaviors more natural

- Disadvantages:

- More confounding variables present than in a lab experiment
 - Less control over variables gives weaker evidence for cause & effect relationship

Research Methods

- **Quasi-Experiment**
 - Research design similar to an experiment except that participants cannot be randomly assigned to the experimental and control groups
 - Random assignment impossible because independent variable is presence of pre-existing difference

Research Methods

- **Quasi-Experiment**

- Advantages:

- Can point in the direction of a causal relationship

- Disadvantages:

- Lack of random assignment means you cannot establish causal relationships because of possible confounding variables

Ethics

- Informed Consent
- Freedom to Withdraw
- No Harm
- Deception
- Debriefing
- Confidentiality
- Animal Research
- Institutional Review Board (IRB)

Ethics

- **Informed Consent**

- Participants must be informed of the general procedure of the study and of their right to withdraw at any point if they choose
- Participants must give explicit consent to be included in a psychological study
- Parents could give consent for those under 18

Ethics

- **Freedom to Withdraw**
 - Participants have the right to leave the study at any time
 - If participants begin a study, they are not obligated to finish
 - Participants can choose to have their data removed from the research results

Ethics

- **Do No Harm**

- Participants cannot be harmed in any way: physical, psychological, emotional, etc.
- If any harm might come to participants, they must be informed of it before giving consent

Ethics

- **Deception**

- Participants should not be lied to
- If the true nature of a study could be easily guessed or influence behavior, then slight deception may be used pending IRB approval
- Deception of participants cannot be enough to change their willingness to participate in the study

Ethics

- **Debriefing**

- Participants must be informed of what the study was for, what data was collected from them, and the results of the study upon its completion
- Necessary regardless of what happens in the study, but *especially* when deception is used

Ethics

- **Confidentiality**

- When research data is shared, participants' names cannot be associated with it
- Must remain anonymous

Ethics

- **Animal Research**
 - Animals do not have the same rights that humans do, and more can be done to them for the sake of research
 - Any pain and suffering (and possible death) must be as minimal as possible and be warranted by the topic of study
 - Animal should be treated well and housed in humane conditions while part of the study

Ethics

- **Institutional Review Board (IRB)**
 - Institutions that conduct psychological research have an IRB which will look through all research proposals and decide if the study is ethical or not
 - Studies cannot be conducted unless approved by the IRB

Statistics

- Descriptive Statistics
- Inferential Statistics

Statistics

- Descriptive Statistics: branch of statistics dealing with *summarization* and description of collections of data—data sets
- Inferential Statistics: branch of statistics *drawing conclusions* about a population by using a random sample drawn from that population

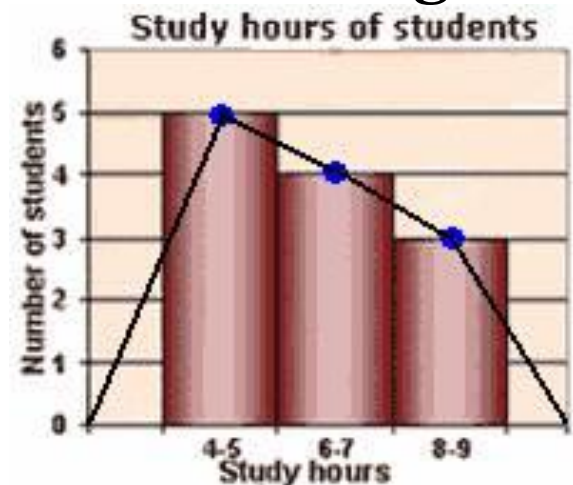
Descriptive Statistics

- **Measures of Central Tendency**
 - Description of the average or typical score for a set of research data or distribution
 - Mode: most frequently occurring score
 - Median: middle score, when the set of data is ordered by size
 - Mean: arithmetic average of a set of data; determined by adding all scores and then dividing by the number of scores

Descriptive Statistics

- **Frequency Distributions**

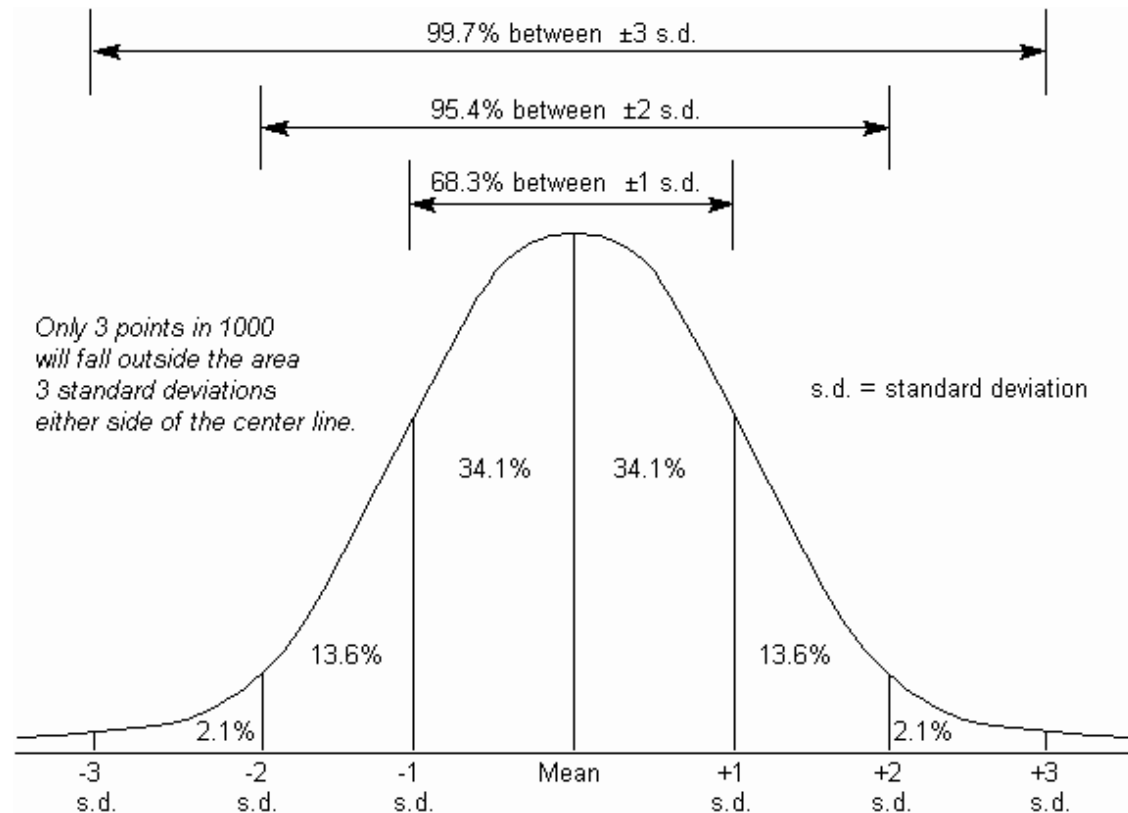
- Histogram: graphical display of numerical data in the form of upright bars, with the area of each bar representing frequency
- Frequency Polygon: graphic display of the frequency of a phenomenon that uses straight lines and points



Descriptive Statistics

- **Frequency Distributions**

- Normal Distribution: symmetric, bell-shaped curve



Descriptive Statistics

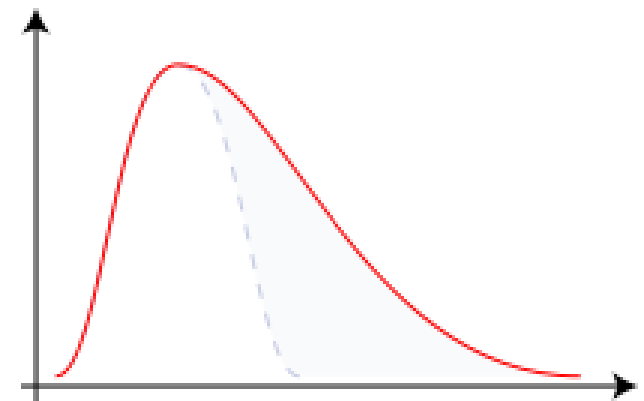
- **Frequency Distributions**

- Z Score: a measure of how many standard deviation units from the mean a particular value of data lies
- Percentile: percentage of scores in a frequency distribution which are lower than or equal to a particular data value

Descriptive Statistics

- **Frequency Distributions**

- Positively Skewed Distribution: distribution in which only a few of the data points are in the upper range of scores; typically in this distribution the mean $>$ median $>$ mode

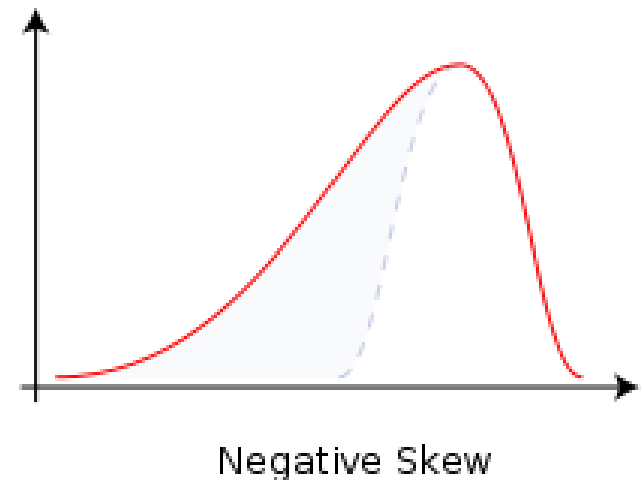


Positive Skew

Descriptive Statistics

- **Frequency Distributions**

- Negatively Skewed Distribution: distribution in which only a few of the data points are in the lower range of scores; typically in this distribution the mode $>$ median $>$ mean



Descriptive Statistics

- **Measures of Variability**

- Describes the spread or dispersion of scores for a set of data or distribution

- Range: largest score minus the smallest score
 - Variance: measure of statistical dispersion, the variance is a way to capture its scale or degree of being spread out
 - Standard Deviation: measures the average distance between each score and the mean of the data set; square root of the variance

Descriptive Statistics

- **Measures of Variability**

- Steps to Find Variance & SD

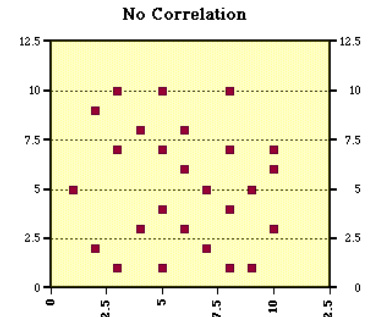
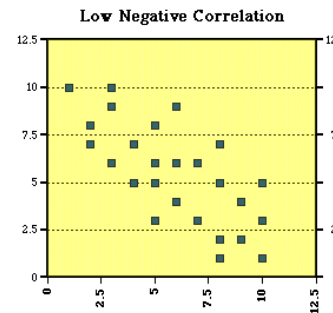
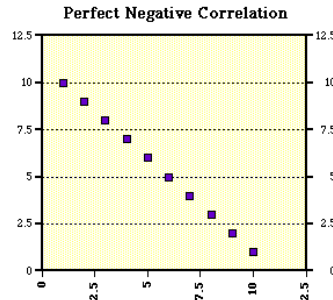
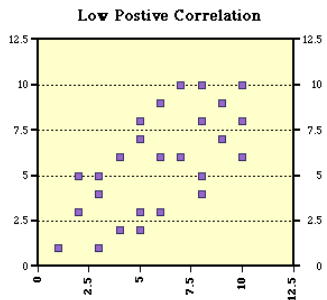
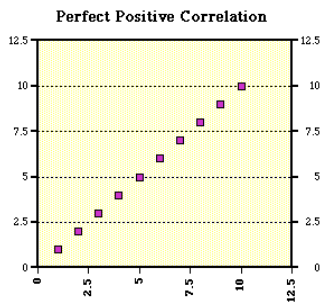
- Find mean of data set
 - Find the difference b/w each point and the mean
 - Square each difference
 - Add squares together
 - Divide by the number of data points (=Variance)
 - Take the square root of that number (=SD)

Descriptive Statistics

- **Correlational Data**

- Correlation Coefficient (r)

- Strength: the less the scatter, the higher the strength and higher the predictability (0-1)
- Direction: slope of the line made by the data points is either positive or negative (+ or -)



Inferential Statistics

- **Statistical Significance (P)**
 - The condition that exists when the probability that the observed findings are due to chance is less than 1 in 20 ($p < .05$)
 - Results are likely due to manipulation of treatment and not due to random chance
 - Found by completing a t-test

Inferential Statistics

- **Meta-Analysis**

- A statistical technique in which the results of numerous studies are combined in order to improve the reliability of the results
- Studies chosen for inclusion in a meta-analysis must be sufficiently similar in order to accurately combine their results
- Combining studies in this fashion effectively increases the number of participants which increase their power and reliability.