

## Psychology CHAPTER 2

### Methodology

## What is Psychology?

- Psychology
  - Psyche: Mind
  - Logos: Knowledge or study
- Definition: The **SCIENTIFIC** study of **BEHAVIOR** and mental processes
  - Behavior: Overt, i.e. can be directly observed (crying)
  - Mental Processes: Covert, i.e. cannot be directly observed (remembering). May entail use of fMRI, PET scans, CAT scans, EEG, etc.

## Critical Thinking: Key Principles

- Few truths transcend the need for empirical testing (No anecdotal stories accepted here)
- Evidence varies in quality
- Authority or claimed expertise does not automatically make an idea correct
- Critical thinking requires an open mind

## Critical Thinking

- Ability to analyze, evaluate, and synthesize information
  - What would you expect to see if the claim were true?
  - Gather evidence relevant to the claim
  - Evaluate the evidence
  - Draw a conclusion
- Oftentimes used in research

## What Might a Psychologist Research?

- Development: Course of human growth and development
- Learning: How and why it occurs in humans and animals
- Personality: Traits, motivations, and individual differences
- Sensation and Perception: How we come to know the world through our five senses
- Cultural: How culture affects behavior

## What Might a Psychologist Research? (cont.)

- Comparative: Study and compare behavior of different species, especially animals
- Biopsychology: How behavior is related to biological processes, especially activities in the nervous system
- Gender: Study differences between males and females and how they develop
- Social: Human and social behavior
- Evolutionary: How our behavior is guided by patterns that evolved during our history

## What Are the Goals of Psychology?

- Description of Behaviors: Naming and classifying various observable, measurable behaviors
- Understanding: The causes of behavior(s), and being able to state the cause(s)
- Prediction: Predicting behavior accurately
- Control: Altering conditions that influence behaviors in predictable ways
  - Positive Use: To control unwanted behaviors, (e.g., smoking, tantrums, etc.)
  - Negative Use: To control peoples' behaviors without their knowledge

## Empiricism: The Goals

- To measure and describe behaviors
- To gather empirical evidence: Information gained from direct observation and measurement
- To gather data: Observed facts

## Scientific Observation

- Definition: Designed and structured to answer questions about the world
- Research Method: A systematic procedure for answering scientific questions

## Scientific Theory

- A system of ideas that interrelates facts and concepts, summarizes existing data, and predicts future observations
  - A good theory must be falsifiable; i.e., operationally defined so that it can be disconfirmed

## The Scientific Method

- Six Basic Elements
  - Observation
  - Formulate a testable question to be answered.
  - Proposing a hypothesis (an educated guess that can be tested)
  - Collect data using observations
    - Direct Observation
    - Questionnaire
    - Interview
    - Psychological Tests
    - Recording Physiological data
    - Examination of Archival records
  - Analyzing data using reliable and valid measurements (see 1-5 on the next slide)
  - Use the data yielded by the method to draw a conclusion regarding the hypothesis.
  - Publishing results will lead to antithesis (other scientists poke holes in your thesis)
  - Building a theory: Thesis ---Antithesis---Synthesis, and on and on...

## The Importance of Appropriate Measurement

- Measurements must yield reliable and valid results.
  - Reliability: Independent measurements of the same behavior should result in similar and consistent data.
  - Validity: Measurements measure what they are intended to measure.

## Research Methods

1. Experiment
2. Naturalistic Observation
3. Case Study (aka: clinical studies)
4. Surveys
5. Correlational studies (usually done after 1-4 have shown that your hypothesis DOES prove that there is a relationship, but NOT NECESSARILY proof of a **cause and effect** relationship )

## 1. Experiments

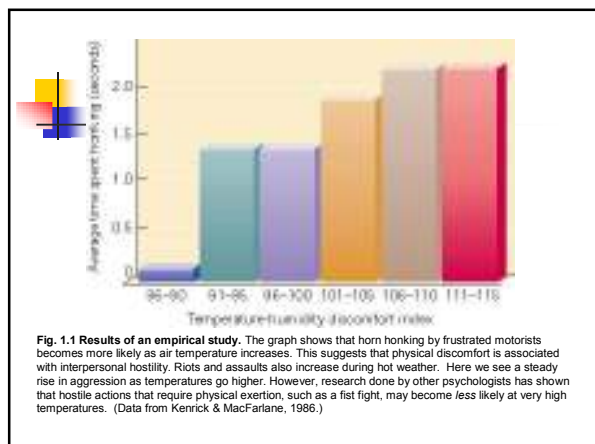
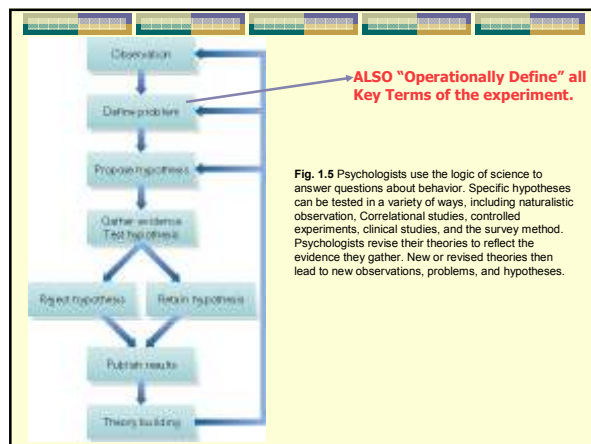
- To identify cause-and-effect relationships, we conduct experiments
  - Directly vary a condition you might think affects behavior. Where "X" = some condition and "Y" = some behavior.
  - Create two or more groups of subjects, alike in all ways except the condition you are varying (X)
  - Record whether varying the condition has any effect on behavior (Y)

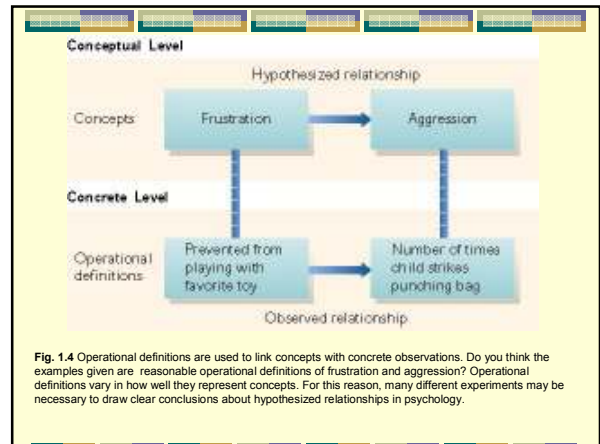
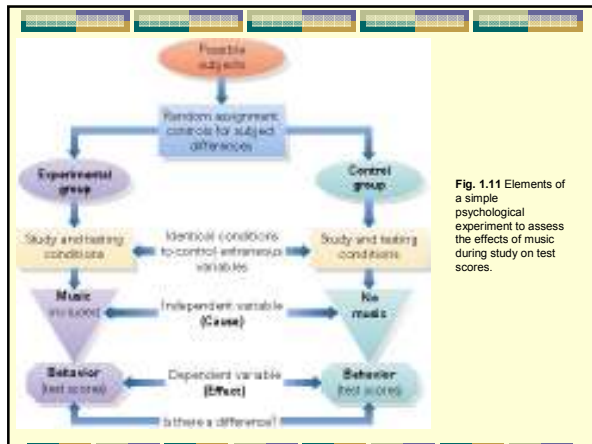
**VARIABLES:** Defined as Any condition that can change, and might affect, experiment's outcome

- Independent Variable: Condition(s) altered by the experimenter; experimenter sets their size, amount, or value; these are suspected causes for behavioral differences
- Dependent Variable: Demonstrates effects that independent variables have on behavior
- Extraneous Variables: Conditions that a researcher wants to prevent from affecting the outcomes of the experiment (e.g., number of hours slept before the experiment)

## Groups

- Experimental Group: The group of subjects that gets the independent variable
- Control Group: The group of subjects that gets all conditions EXCEPT the independent variable
- Random Assignment: Subject has an equal chance of being in either the experimental or control group





### Experimental Method

- Variables
  - Independent variables
  - Dependent variables
  - Control variables
- Conditions
  - Experimental conditions
  - Control conditions

	Pre test	Treatment	Post test
Exp 1.	T1	X	T2
Exp. 2	T1	Y	T2
Cntl	T1		T2

### Example of Experimental Method

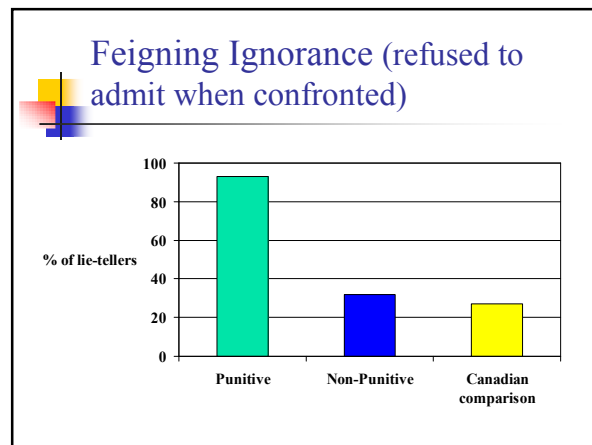
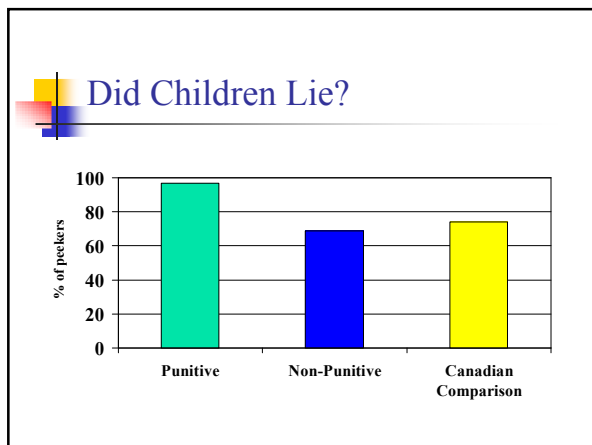
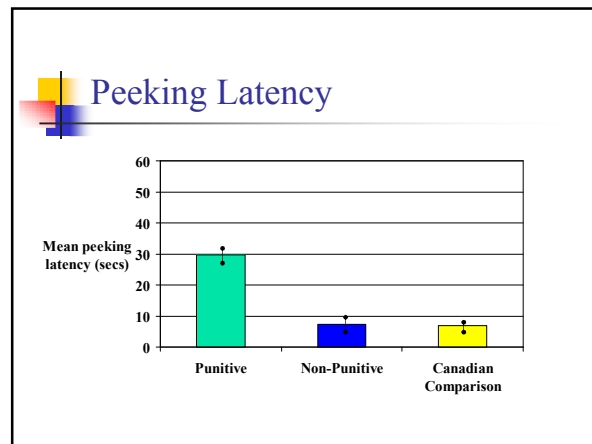
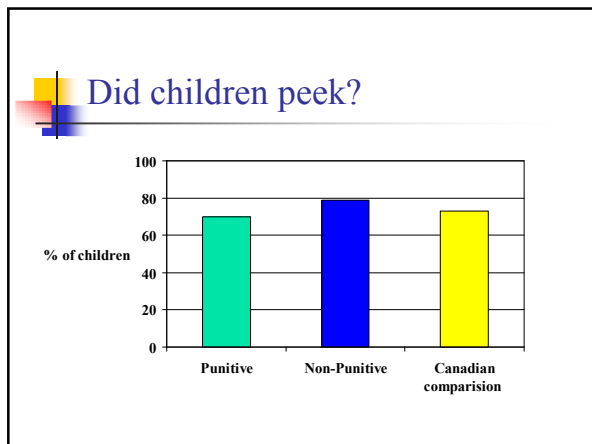
- Bandura (1965)
  - Observational learning
    - Whether children would imitate aggressive behaviors
  - Conditions
    - no consequence
    - model rewarded
    - model punished

### Another Example of the Experimental Method

- Talwar & Lee (2004)
  - Impact of punitive environment on young children's lying behavior
  - Method
    - Temptation Resistance Paradigm
      - Did you peek?
      - Who do you think it is?
    - Conditions
      - African punitive school
      - African nonpunitive school
      - Canadian Comparison

### Method

- Temptation Resistance Paradigm
  - Guess the names of different toys
  - two warm-up guessing trials
  - test trial



- ### CONCLUSION
- Children from the punitive environment resisted temptation longer
  - Children from the punitive environment were more inclined to lie and lie earlier
  - Children from the punitive environment were better liars

- ### Experimental Method
- Pros
    - Excellent Control
    - Creates DATA
  - Cons
    - Does not prove Cause and Effect
    - Cannot make causal conclusions
    - Artificial

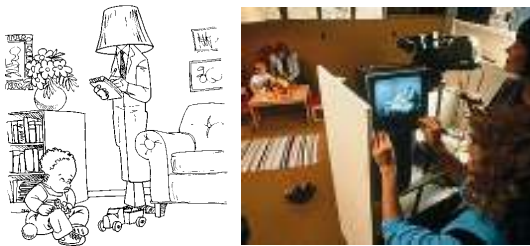
## ASSIGNMENT

- IN GROUPS OF TWO:
  - Create an hypothesis (if this happens then this behavior will result)
  - Operationally define all Key Terms (you can't just say "if it gets warmer" be specific i.e. "For every 5 degrees above 75 degrees Fahrenheit frustration levels (defined by blood pressure and heart rate increase) will increase.
  - Explain how you will choose your experimental groups
  - Define your I.V. and D.V.
  - What Extraneous variables should you account for?
  - Pretend that the results validate your hypothesis—do you think that this also shows a Cause and Effect relationship?
  - How could you now look for a Cause and Effect relationship?

## 2. Naturalistic Observation

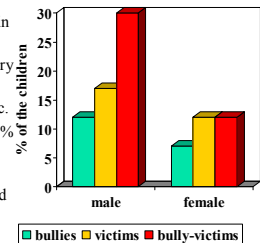
- Observing a person or an animal in the environment in which they/it live(s)
- Problems
  - Observer Effect: Changes in behavior caused by an awareness of a person or animal being observed
  - Observer Bias: Occurs when observers see what they expect to see or record only selected details
  - Anthropomorphic Fallacy: Attributing human thoughts, feelings, or motives to animals, especially as a way of explaining their behavior (e.g., "Anya, my cat, is acting like that because she's feeling depressed today.")

## Natural Observational Method



## Example of Natural Observational Method

- Craig & Pepler (1992)
  - Bullying & victimization in the playground
    - Bullying occurred every 7.5 min.
    - Average length: 38 sec.
    - Adults intervened in 3% of the time
    - 36% involved objects, 24% racially motivated



## Natural Observational Method

- Pros
  - Observing real children's real behaviors
- Cons
  - Difficulty to control variables
  - Difficulty to interpret data
  - Cannot make causal conclusions

## 3. Case Study (Clinical Studies)

- Case Study: In-depth focus on all aspects of a single case
- Natural Clinical Tests: Natural events, such as accidents, that provide psychological data

## The Case Study

- Provides a detailed description of a person's life & psychological problems
- Is helpful because it can serve as a source of new ideas about behavior
  - Freud's theories based entirely on case studies
- May offer tentative support for a theory
- May challenge a theory's assumptions
- May inspire new therapeutic techniques
- May offer opportunities to study unusual problems

## Case Study Method

- Pros
  - Depth of analysis
- Cons
  - Observers are biased
  - Relies on subjective evidence
    - Is low on internal validity
  - Provides little basis for generalization
    - Is low on external validity
  - Cannot make causal conclusions
  - Time consuming

## 4. Surveys

- Public opinion research is usually focused on the distribution of opinions among many individuals in a population.
- The challenge for survey researchers is to measure opinions without having to survey the whole population (which is almost always impossible). The common solution is to interview a sample of people that is representative of the population one is interested in.
- There are two issues that are important in selecting a sample: Sample size and sampling procedure.
- Let's begin with the issue of sample size...

## Probability Sampling

- In **Probability Sampling**, every person in the population has a known probability of being chosen for the sample. Sampling procedure that permits the calculation of sampling error.
  - In one form of Probability Sampling called **Random Sampling**, each person in the population has the same probability of being chosen. This is the ideal way of obtaining a representative sample.
  - **Quota Sampling** is one method of achieving representative sampling. It involves trying to define attributes that are relevant to the attitude being measured and then mirroring the proportions of the population with these attributes in the sample.

## Potential Problems

- Sample Bias: when the sample is NOT representative of the population from which it was drawn.
- Experimenter Bias can be solved by:
  - Blind Study
  - Double Blind Study
- Social Desirability Bias
  - 80% of high school boys have had sex
  - 20% of high school girls have had sex

## How Many People in the Sample in order to overcome Sample Bias?

Unless one surveys everyone in a population, there is going to be some sampling error.

For every sample size, there is a margin of error (sampling error). The larger the sample, the smaller the sampling error.

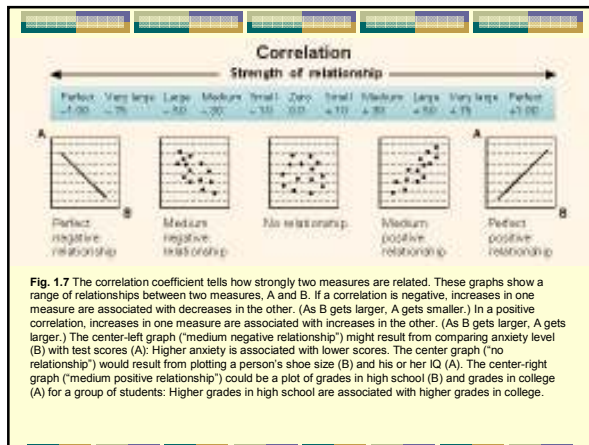
Sampling error does not decrease linearly. For each person added to a sample, the margin of error decreases by less and less (diminishing returns).

## Sample Size and Sampling Error

Sample Size	Margin of Error
100	+ or - 10%
500	+ or - 4.5%
1500	+ or - 2.5%
2000	+ or - 2.2%

## 5. Correlations and Relationships

- Correlational Studies: Find existence of a consistent, systematic relationship between two events, measures, or variables
- Correlation Coefficient: Statistic ranging from  $-1.00$  to  $+1.00$ ; the sign indicates the **direction** of the relationship
  - Closer the statistic is to  $-1.00$  or to  $+1.00$ , the stronger the relationship
  - Correlation of  $0.00$  demonstrates no relationship between the variables



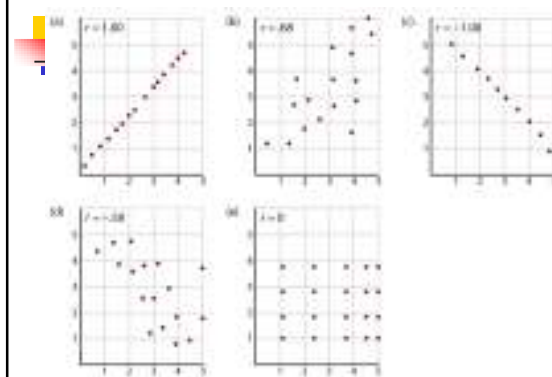
## Correlation and Causation

- Correlation
  - Whether two or more than two variables change in a similar fashion
- Causation
  - Whether the presence of one variable leads to the presence of another variable

## Correlations

- Correlation is the relationship between two variables.
- Correlations can be either positive or negative in direction.
- The direction and strength of a correlation are indicated by a statistic known as the correlation coefficient.

## Correlations—Five Variations

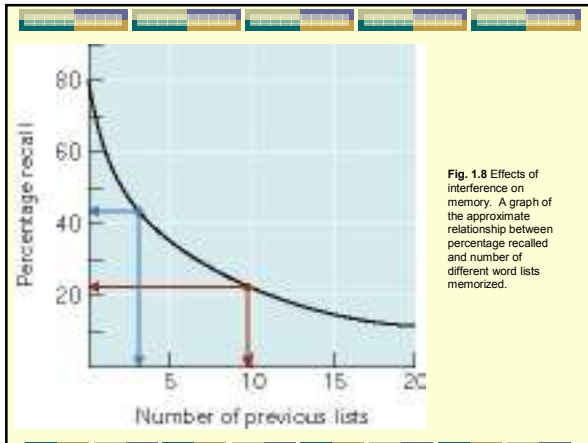


## Positive and Negative Correlations

- **Positive correlation:** High values of one variable are associated with high values of another variable.  
Example: The more time spent reading, the higher reading achievement scores. Values of correlation coefficient range from +1.0 (highest) to +.01 (lowest).
- **Negative correlation:** High values of one variable are associated with low values on another variable.  
Example: The more overweight the child, the slower his or her running speed. Values of correlation coefficient range from -1.0 to -.01.

## Correlation vs. Causation

- Correlation does not equal causation.
- Correlation does not tell you if one variable causes another. Example: Greater time spent reading might mean higher reading scores, but greater reading skill might also lead to more time spent reading.
- There may be a third variable: Perhaps the home environment led the child to read more and that accounts for higher reading achievement score.
- Correlation does not demonstrate causation: Just because two variables are related does NOT mean that one variable causes the other to occur. Finding causation requires an experiment.



## Evaluating Experiments' Results

- **Statistically Significant:** Results gained would occur very rarely by chance alone
- **Meta-analysis:** Study of results of other studies

**Table 1.5 – Comparison of Psychological Research Methods**

	ADVANTAGES	DISADVANTAGES
<b>Naturalistic observation</b>	Minimal intrusion; it involves observing and recording behavior in natural settings and requires no artificial reward and punishment. It is possible to observe of relatively rare behaviors that are part of the individual's natural setting.	Little or no control; especially when the behavior is altering the presence of the observer's observation. Only behavioral data can be recorded; internal states or unobservable responses cannot be recorded.
<b>Correlational method</b>	It is possible to observe of relatively rare behaviors that are part of the individual's natural setting.	It is possible to observe of relatively rare behaviors that are part of the individual's natural setting.
<b>Experimental method</b>	One can control the environment and identify cause-and-effect relationships. One can control the environment and identify cause-and-effect relationships.	It is possible to observe of relatively rare behaviors that are part of the individual's natural setting.
<b>Clinical method</b>	It is possible to observe of relatively rare behaviors that are part of the individual's natural setting.	It is possible to observe of relatively rare behaviors that are part of the individual's natural setting.
<b>Survey method</b>	It is possible to observe of relatively rare behaviors that are part of the individual's natural setting.	It is possible to observe of relatively rare behaviors that are part of the individual's natural setting.

## Things to beware of

- Placebo Effect
- Experimenter Effects
- Pseudo-Psychologies
- Bad Statistics, Bad Science
- Ethical Guidelines

## Placebo Effects

- Placebo: A fake pill (sugar) or injection (saline)
- Placebo Effect: Changes in behavior that result from belief that one has ingested a drug
  - Placebos alter our expectations about our own emotional and physical reactions
  - These expectancies then influence bodily activities
  - Relieve pain by getting pituitary to release endorphins
  - Also gain some effect through learning

## Controlling Placebo Effects

- Single Blind Experiment: Only the subjects have no idea whether they get real treatment or placebo
- Double Blind Experiment: The subjects AND the experimenters have no idea whether the subjects get real treatment or placebo
  - Best type of experiment if properly set up
  - Herbal remedies may be based on placebo effect

## Experimenter Effects

- Definition: Changes in behavior caused by the unintended influence of the experimenter
- Self-Fulfilling Prophecy: A prediction that leads people to act in ways to make the prediction come true

## Pseudo-Psychologies

- Pseudo means “false.” Any unfounded “system” that resembles psychology and is NOT based on scientific testing
  - Palmistry: Lines on your hands (palms) predict future and reveal personality
  - Phrenology: Personality traits revealed by shape of skull and bumps on your head

## Pseudo Psychologies *(cont.)*

- Graphology: Personality revealed by your handwriting
- Astrology: The positions of the stars and planets at birth determine your personality and affect your behavior
  - Extremely popular today (“What’s your sign?”)

## Pseudo Psychologies *(cont.)*

- Barnum Effect: Always have a little something for everyone; Make sure all palm readings, horoscopes, etc. are so general that something in them will always apply to any one person! (e.g., “Crossing Over with John Edward”; Miss Cleo)
- Uncritical Acceptance: Tendency to believe positive or flattering descriptions of yourself
- Fallacy of Positive Instances: When we remember or notice things that confirm our expectations and forget the rest

### Bad Statistics/Bad Science (Are the Stories in the "National Enquirer" True?)

- Be skeptical
- Consider the source of information
- Ask yourself, "Was there a control group?"
- Look for errors in distinguishing between correlation and causation (are claims based on Correlational results yet passed off as causations?)

### Bad Statistics/Bad Science (Are the Stories in the "National Enquirer" True?)

- Be sure to distinguish between observation and inference (e.g., Robert is crying, but do we know why he is crying?)
- Beware of oversimplifications, especially those motivated by monetary reasons
- Single examples are not proof!

### Ethical Guidelines for Psychological Research

- Do no harm
- Accurately describe risk to potential subjects
- Ensure that participation is voluntary
- Minimize any discomfort to participants
- Maintain confidentiality

### Ethical Guidelines for Psychological Research *(cont.)*

- Do not unnecessarily invade privacy
- Use deception only when absolutely necessary
- Remove any misconceptions caused by deception (debrief)
- Provide results and interpretation to participants
- Treat participants with dignity and respect