Thinking About Psychology: The Science of Mind and Behavior

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Module 02

Research Strategies

Why is Research Important?

Research Methods

- Play “Aliens Have Landed” (11:25) Segment #3 from Scientific American Frontiers: Video Collection for Introductory Psychology (2nd edition).
- Follow with a discussion on the unbiased scientific research.

Scientific Method

- Technique using tools such as observation, experimentation, and statistical analysis to learn about the world
- Through its use, psychology is thereby considered a science.

Research and Research Methodology

- Method of **asking questions** then **drawing logical supported conclusions**
- Researchers need to be able to determine if conclusions are reasonable or not (critical thinking).

Common Sense

- Conclusions based solely on personal experience and sensible logic
- Can lead to incorrect conclusions

Module 2: Research Strategies

Observation and Bias

Observation

- Gathering of information by simply watching subjects
- Can lead to bias

Bias

- Situation in which a factor unfairly increases the likelihood of a researcher reaching a particular conclusion
- Bias should be minimized as much as possible in research

Researcher Bias

- The tendency to notice evidence which supports one particular point of view or hypothesis
- Objectivity tends to reduce bias.

Critical Thinking

- Thinking that does not blindly accept arguments or conclusions but questions their validity

Participant Bias

- Tendency of research subjects to respond in certain ways because they know they are being observed
- The subjects might try to behave in ways they believe the researcher wants them to behave
- Can be reduced by naturalistic observation

Naturalistic Observation

- Method of observation where subjects are observed in their “natural” environment
- Subjects are not aware they are being watched
- Could use hidden cameras or two way mirrors

Module 2: Research Strategies

Case Studies

Case Study

- In depth study of one individual with the hopes of determining universal principles
- This technique is very open to bias
- Difficulty of applying data from one person to everyone

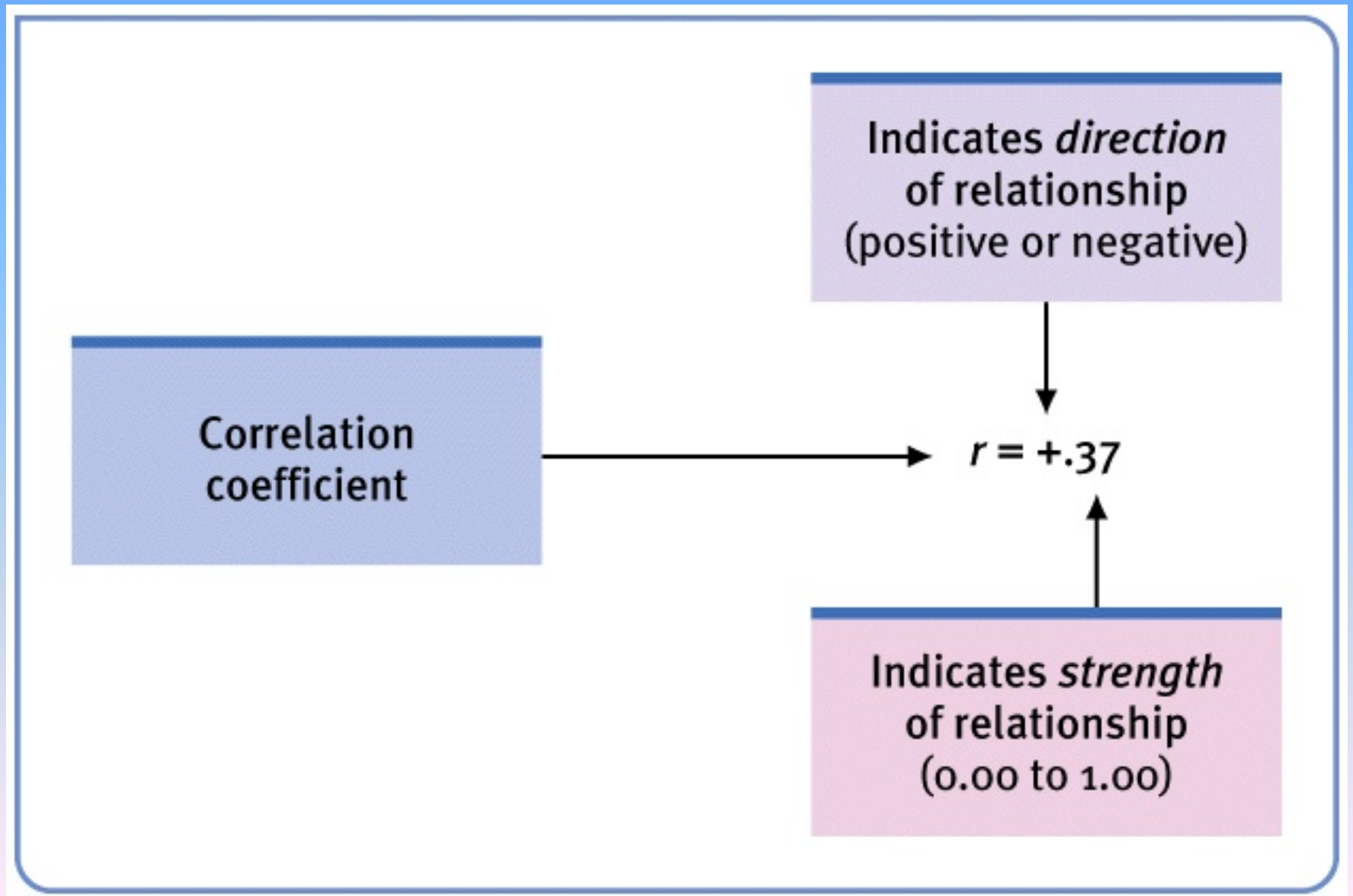
Module 2: Research Strategies

Correlation

Correlational Study

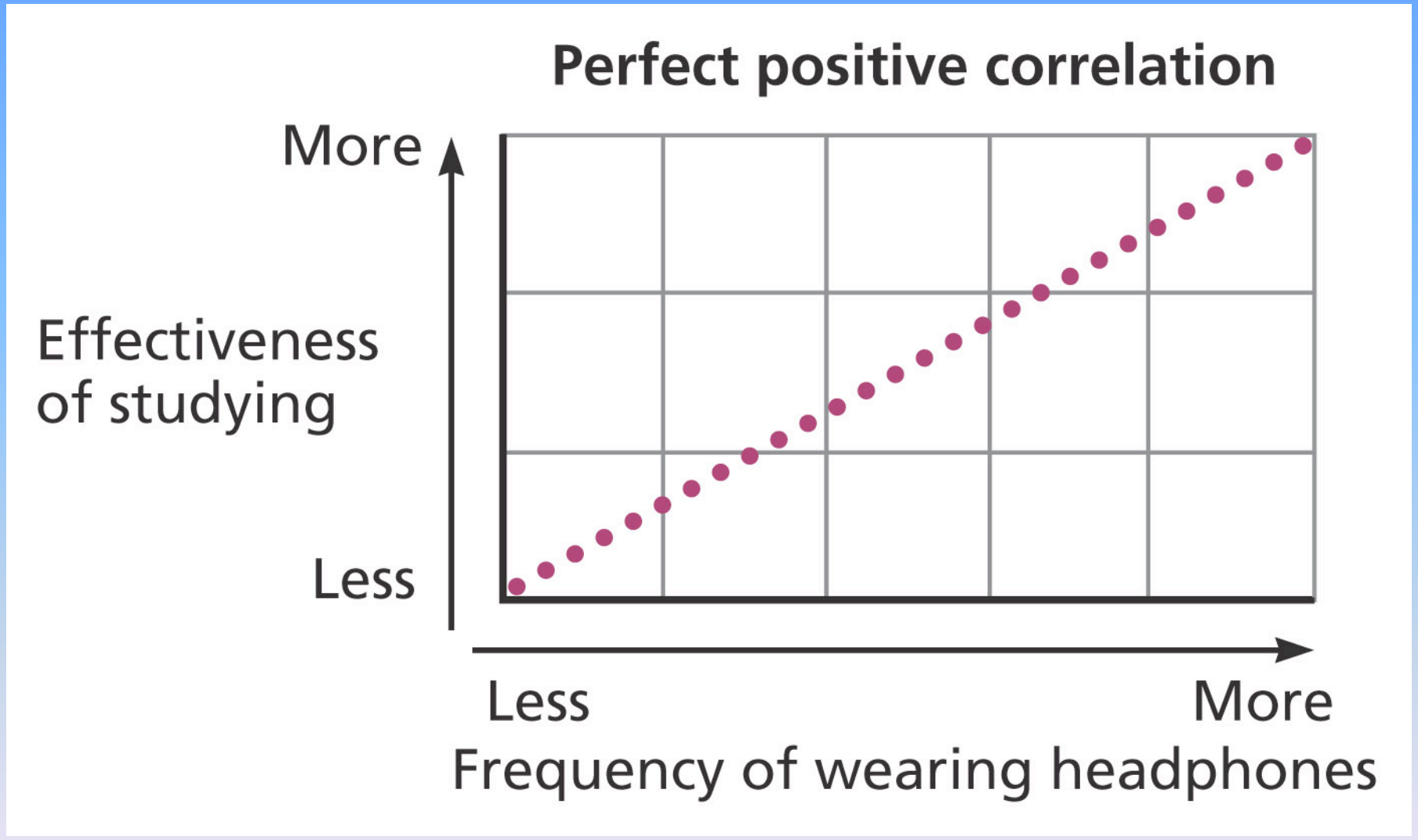
- Research study designed to determine the degree to which two variables are related to one another

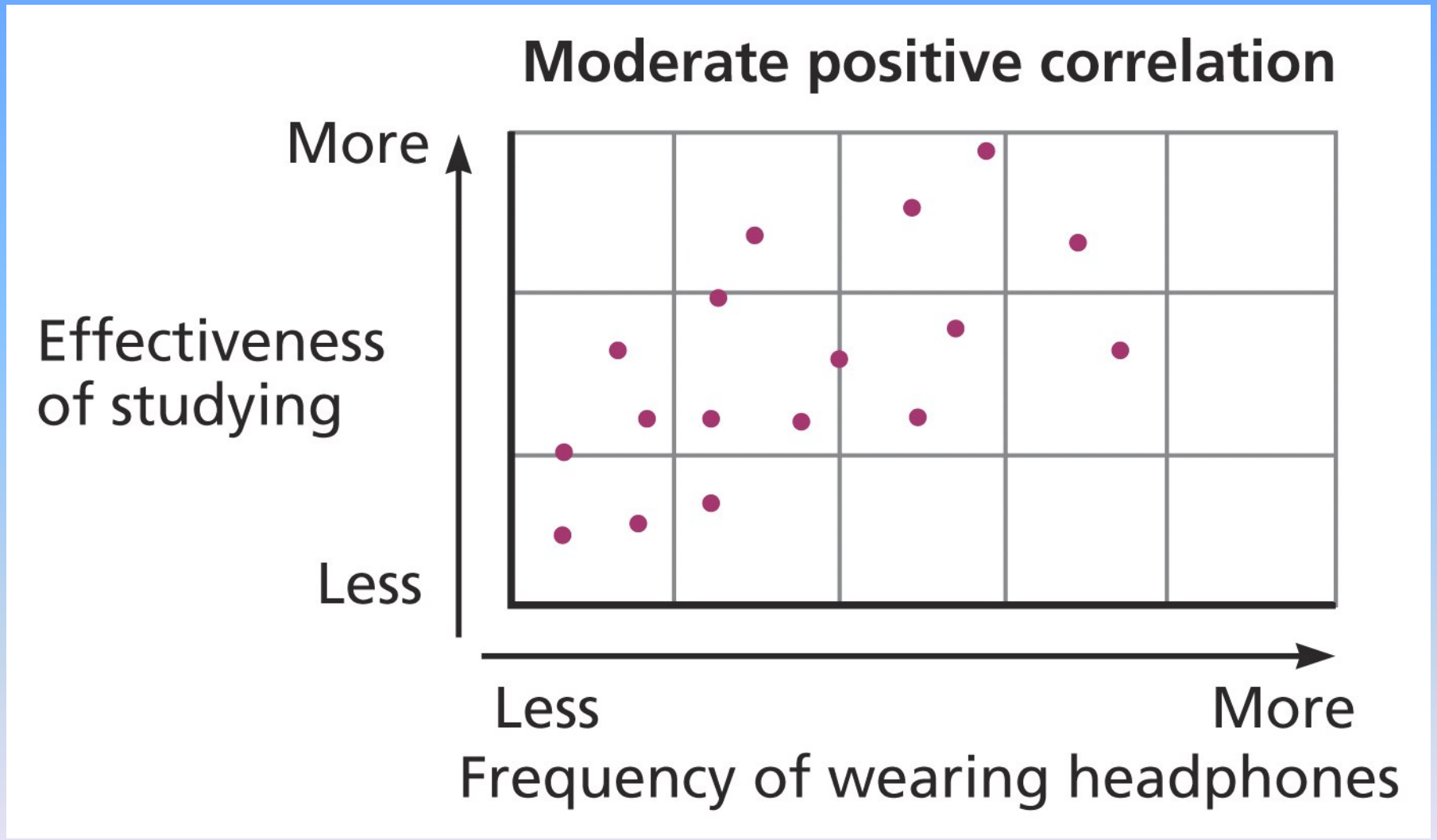
How to Read a Correlation



Positive Correlation

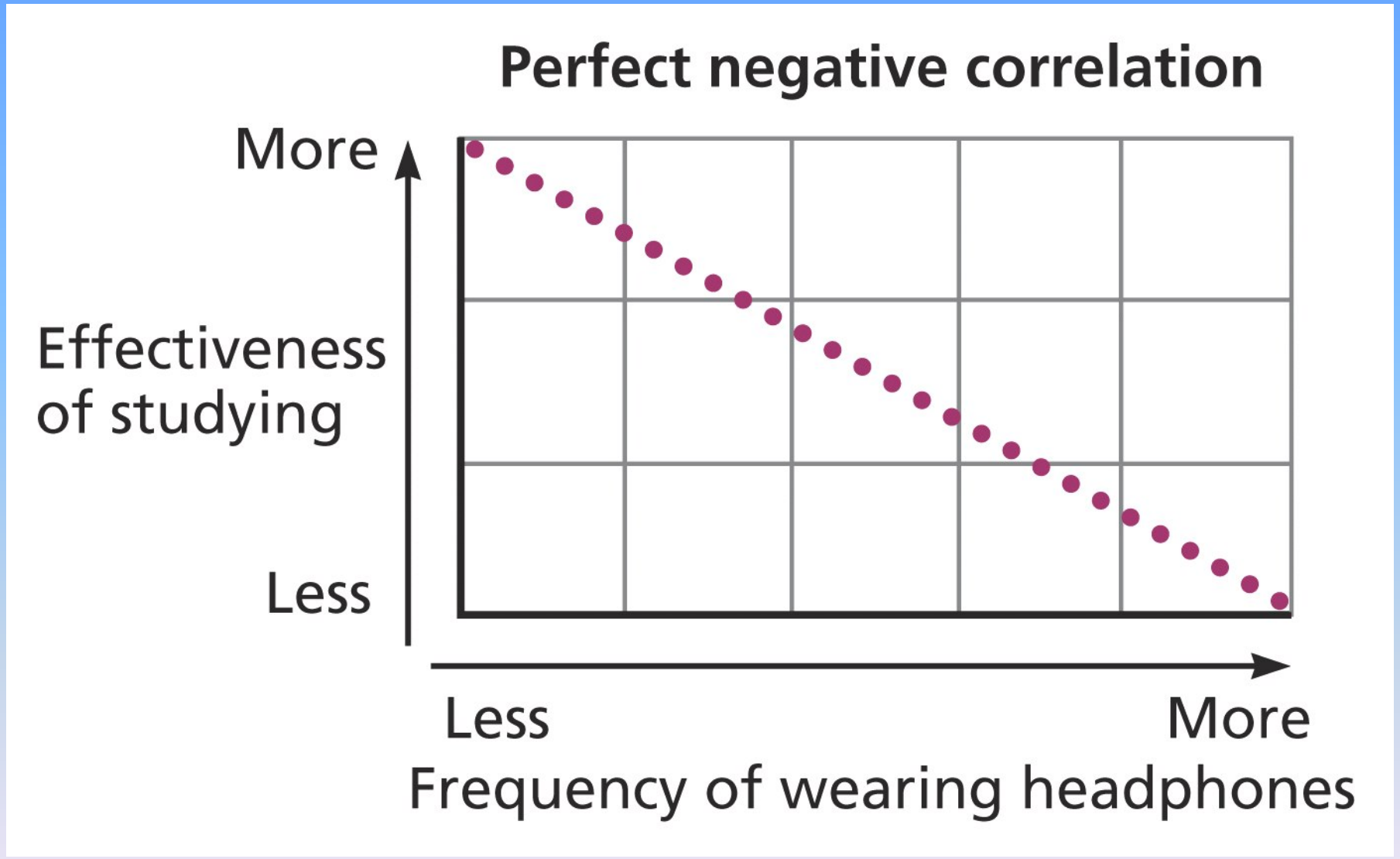
- As the value of one variable increases (or decreases) so does the value of the other variable.
- A perfect positive correlation is +1.0.
- The closer the correlation is to +1.0, the stronger the relationship.

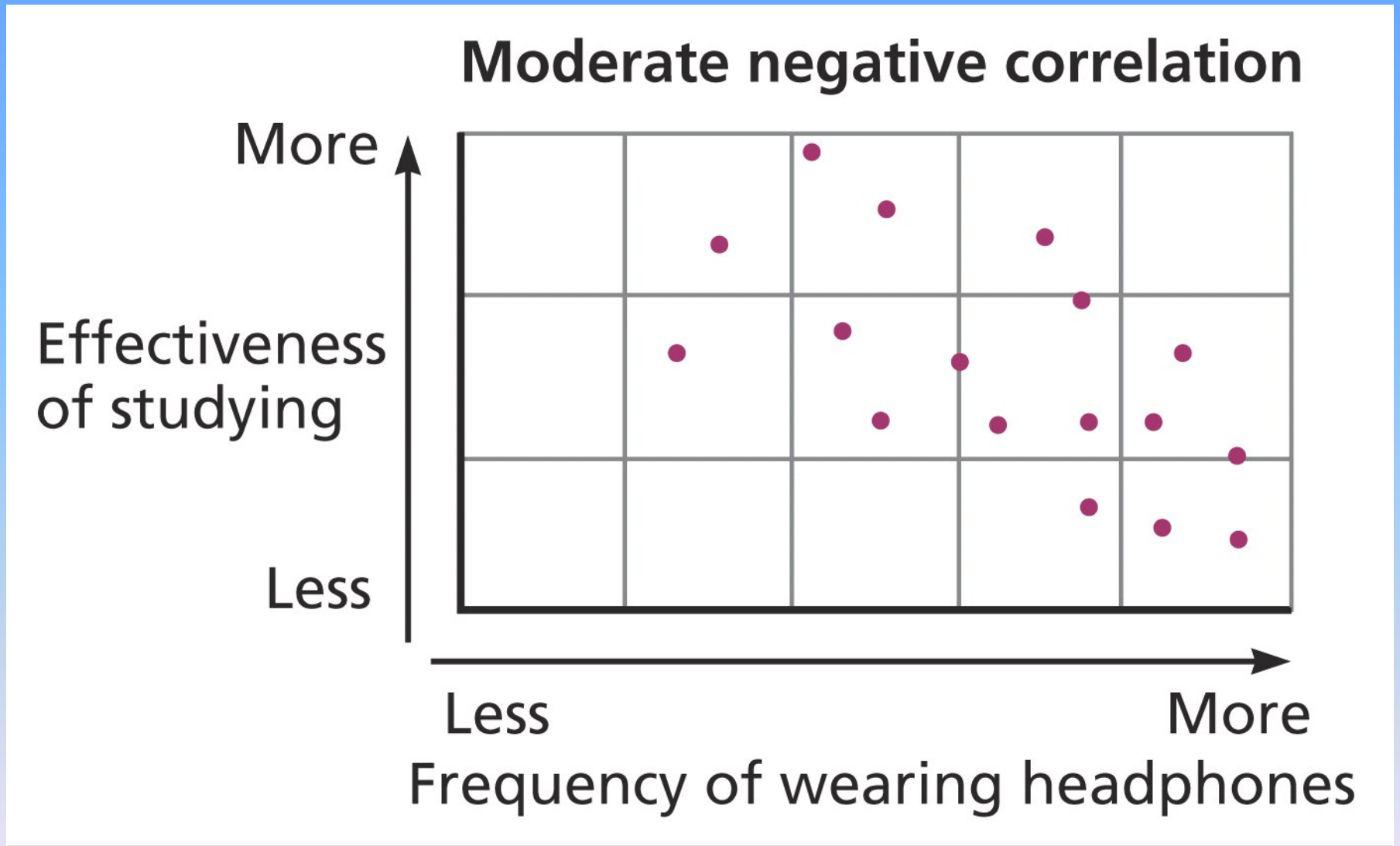

Perfect positive correlation
More
Effectiveness of studying
Less
Less
More
Frequency of wearing headphones


Moderate positive correlation
More
Effectiveness of studying
Less
Less
More
Frequency of wearing headphones

Negative Correlation

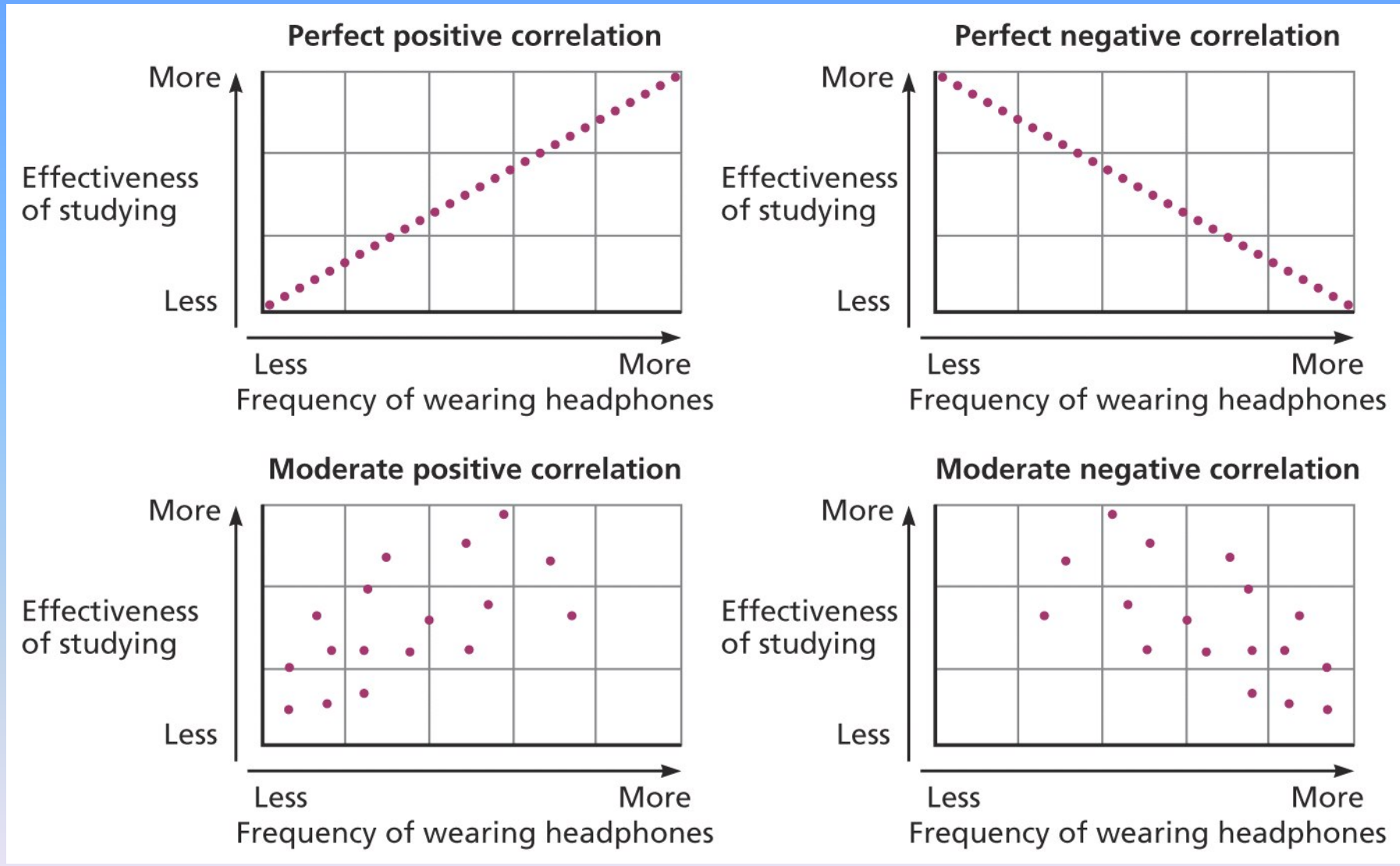
- As the value of one variable increases, the value of the other variable decreases.
- A perfect negative correlation is -1.0.
- The closer the correlation is to -1.0, the stronger the relationship.


Perfect negative correlation
More
Effectiveness of studying
Less
Less
More
Frequency of wearing headphones


Moderate negative correlation
More
Effectiveness of studying
Less
Less
More
Frequency of wearing headphones

Zero Correlation

- There is no relationship whatsoever between the two variables.


Perfect positive correlation
More
Effectiveness of studying
Less
Less
More
Frequency of wearing headphones
Perfect negative correlation
More
Effectiveness of studying
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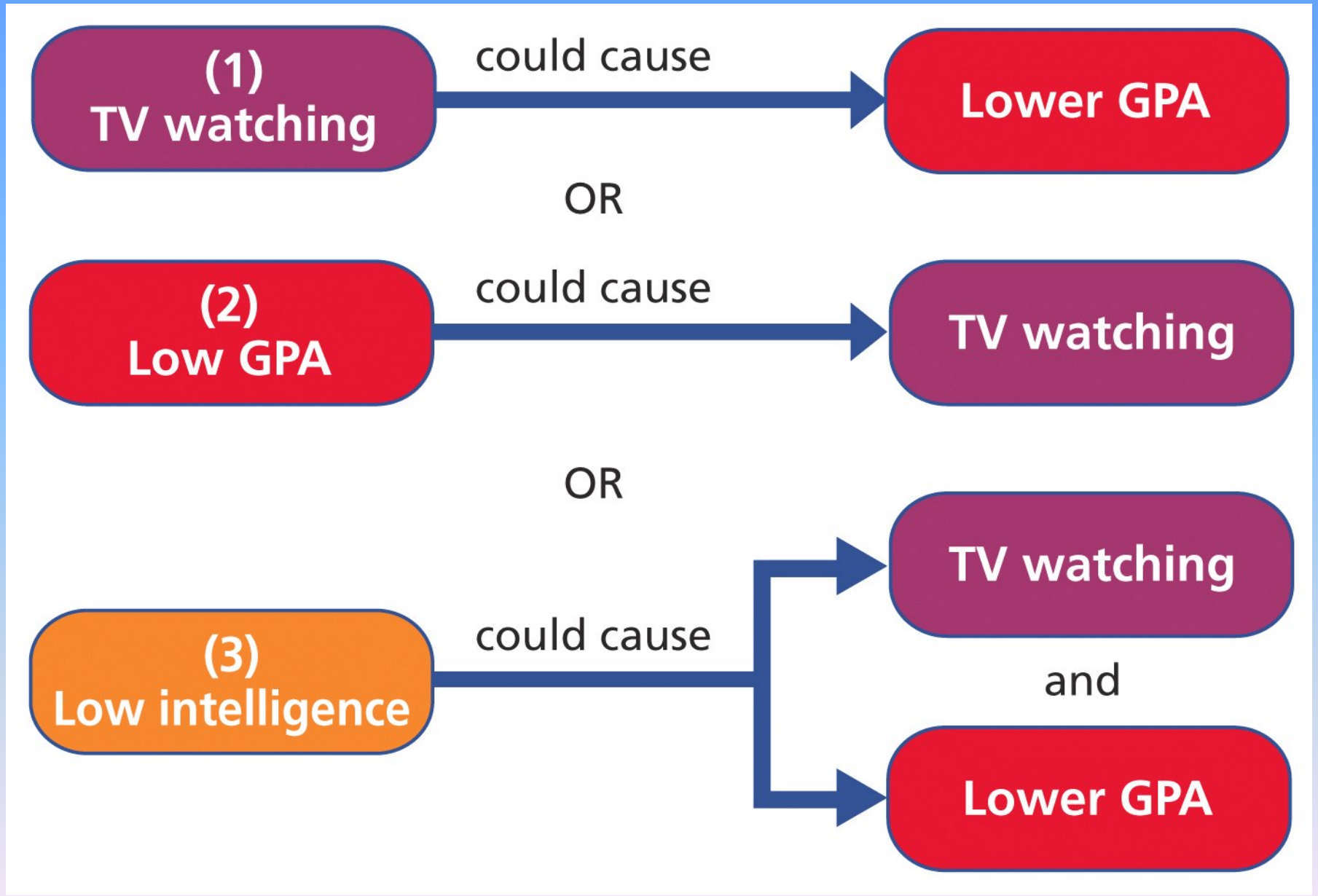
Less
More
Frequency of wearing headphones
Moderate positive correlation
More
Effectiveness of studying
Less
Less
More
Frequency of wearing headphones
Moderate negative correlation
More
Effectiveness of studying
Less
Less
More
Frequency of wearing headphones

Correlational Study

- Important NOT to imply a cause and effect relationship between the variables
- Correlational study does not determine **why** the two variables are related--just that they are related.
- Correlational studies are helpful in making predictions.


(1)
TV watching
could cause
Lower GPA
OR
(2)
Low GPA
could cause
TV watching
OR
(3)
Low intelligence
could cause
TV watching
and
Lower GPA

Module 2: Research Strategies

Surveys

Survey Method

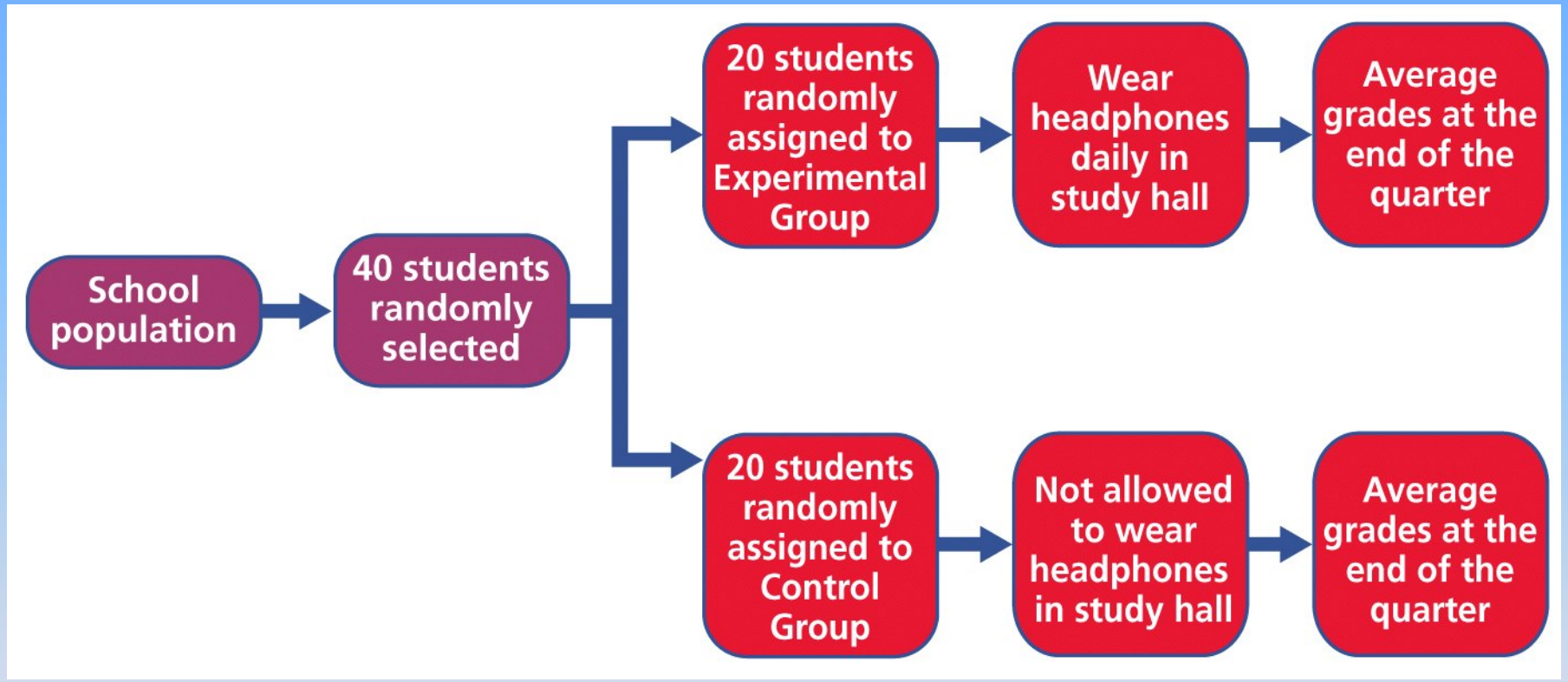
- Research method that relies on self-reports; uses surveys, questionnaires, interviews.
- Usually a very efficient and inexpensive method

Population

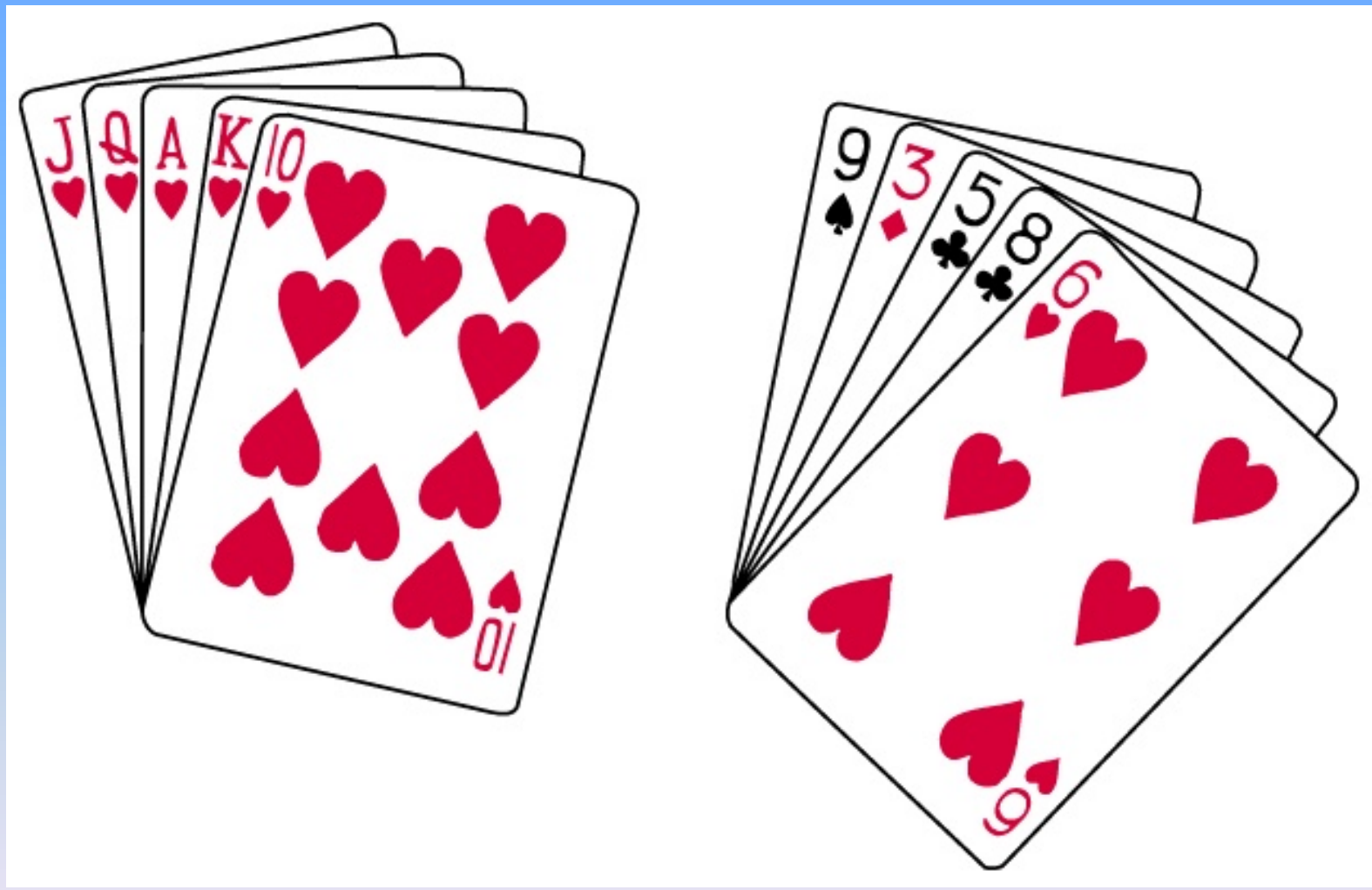
- The total large group being studied from which a sample is drawn for a study

Random Sample

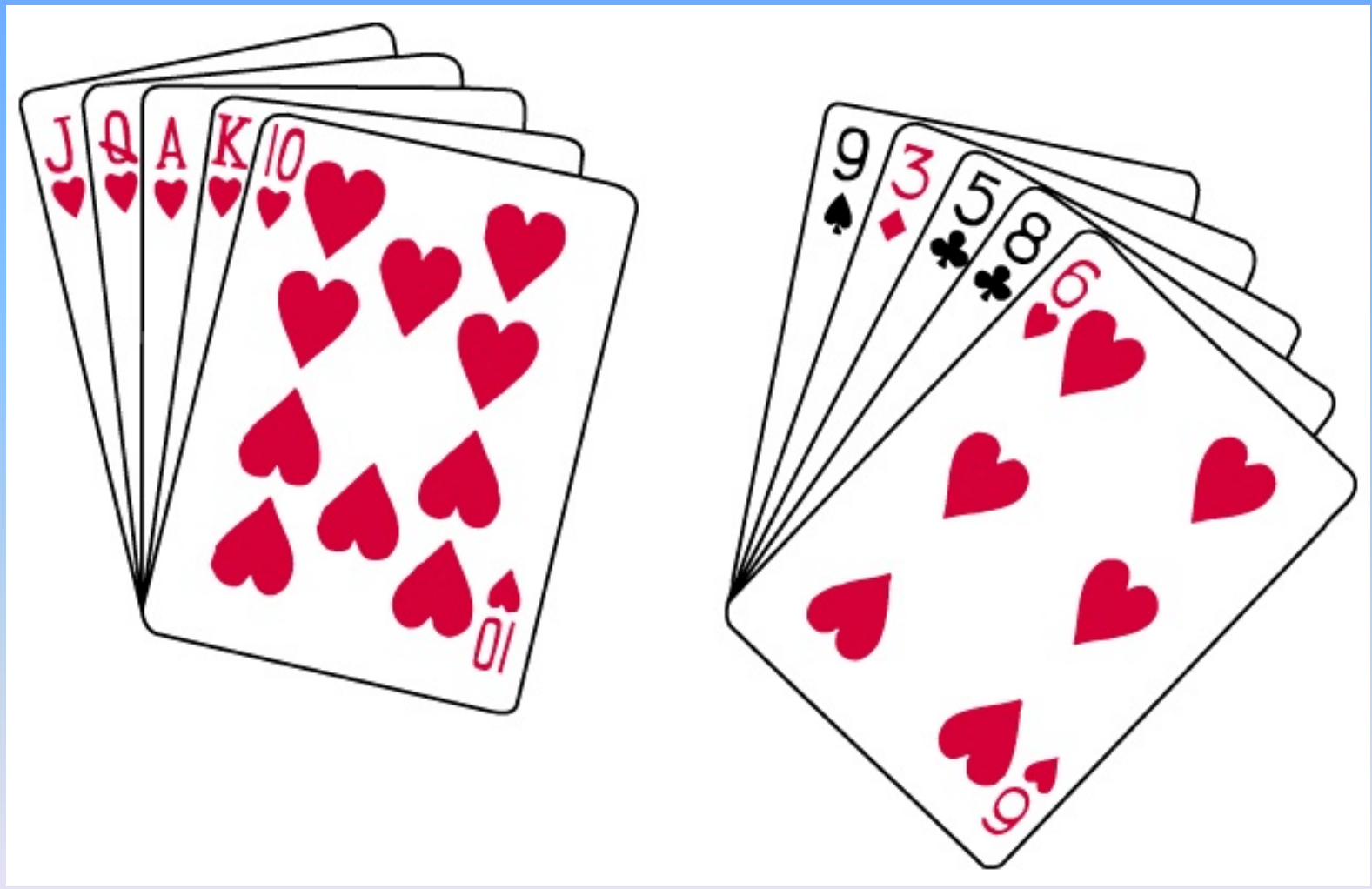
- A sample that represents a population fairly:
  - Each member of the population has an equal chance of being included.
  - If a sample is not random it is said to be biased.


School population
40 students randomly selected
20 students randomly assigned to Experimental Group
Wear headphones daily in study hall
Average grades at the end of the quarter
20 students randomly assigned to Control Group
Not allowed to wear headphones in study hall
Average grades at the end of the quarter

What are the Odds of Each?

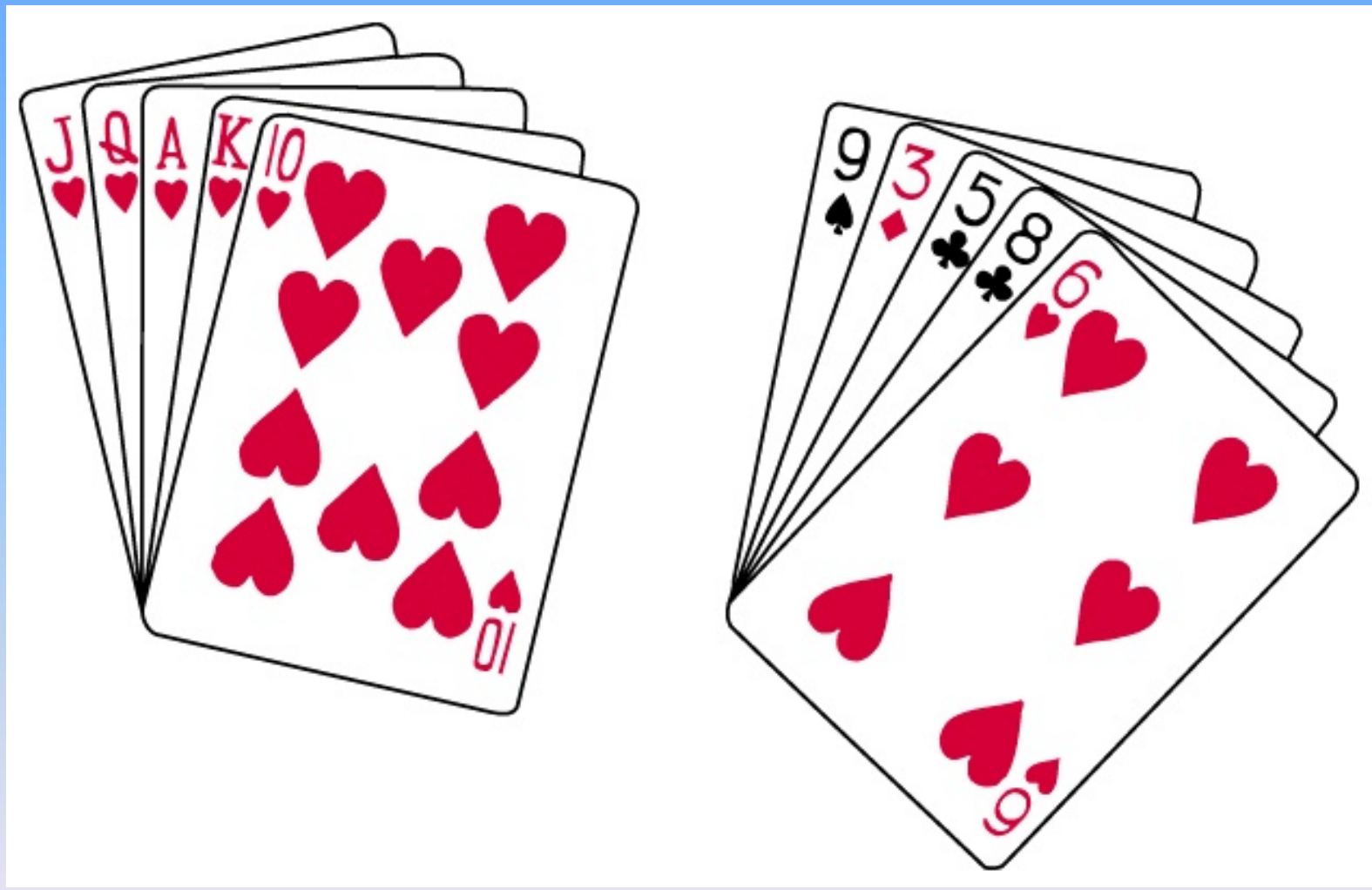


What are the Odds of Each?



1 in 2,598,960

What are the Odds of Each?



1 in 2,598,960

1 in 2,598,960

Module 2: Research Strategies

Longitudinal and Cross-Sectional Studies

Developmental Psychologists

- Psychologists who study how individuals change throughout their lifetime

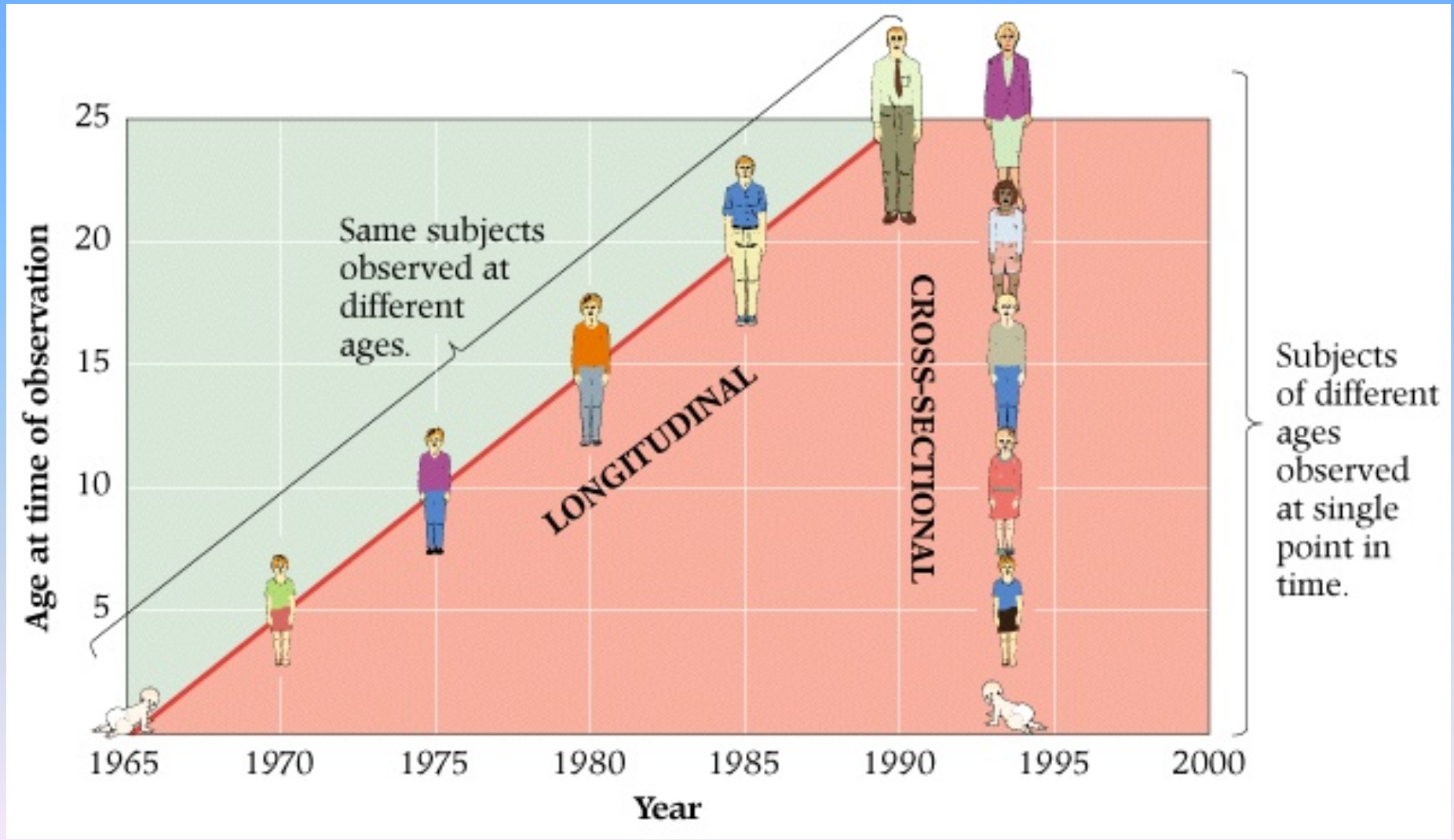
Longitudinal Study

- Developmental study where researchers study the same group of individuals for many years
- Can be very expensive and difficult to conduct

Cross-Sectional Study

- Developmental study where researchers simultaneously study a number of subjects from different age groups and then compare the results
- Cheaper, easier than longitudinal studies, but group differences may be due to factors other than development.

Longitudinal/Cross Sectional Study



Module 2: Research Strategies

Experiments: Hypotheses and Operational Definitions

Experimental Method

- Play “Water, Water Everywhere” (12:20) Segment #2 from Scientific American Frontiers: Video Collection for Introductory Psychology (2nd edition)

Hypothesis

- A testable prediction of the outcome of the experiment or research

Operational Definitions

- A specification of the exact procedures used to make a variable specific and measurable for research purposes
- In evaluating others' research, first determine if you agree with the researchers' operational definitions.

Module 2: Research Strategies

Experiments: Independent and Dependent Variables

Independent Variable

- The experimental variable which causes something to happen
- The “cause variable”
- The variable manipulated by the experimenter
- The variable which should change the dependent variable

Dependent Variable

- The experimental variable which is affected by the independent variable
- The “effect variable”
- The outcome of the experiment
- The variable being measured

Module 2: Research Strategies

Experiments: Groups, Random Assignment, and Confounding Variables

Experimental Group

- The subjects in an experiment who are exposed to the treatment (independent variable)
- Also called the experimental condition
- The group being studied and compared to the control group

Control Group

- Are not exposed to the independent variable
- Results are compared to those of the experimental group
- Also called the control condition

Confounding Variables

- Variables, other than the independent variable, which could inadvertently influence the dependent variable
- These variables should be controlled for in order to draw a true, cause-effect relationship in the experiment.
- Many confounding variables can be eliminated through random assignment.

Random Assignment

- Assigning participants to the control and experimental groups by chance
- Each participant should have an equal chance of being assigned into either group.

Experiments

- Play “Experimental Design” (7:24) Segment #3 from Psychology: The Human Experience

Module 2: Research Strategies

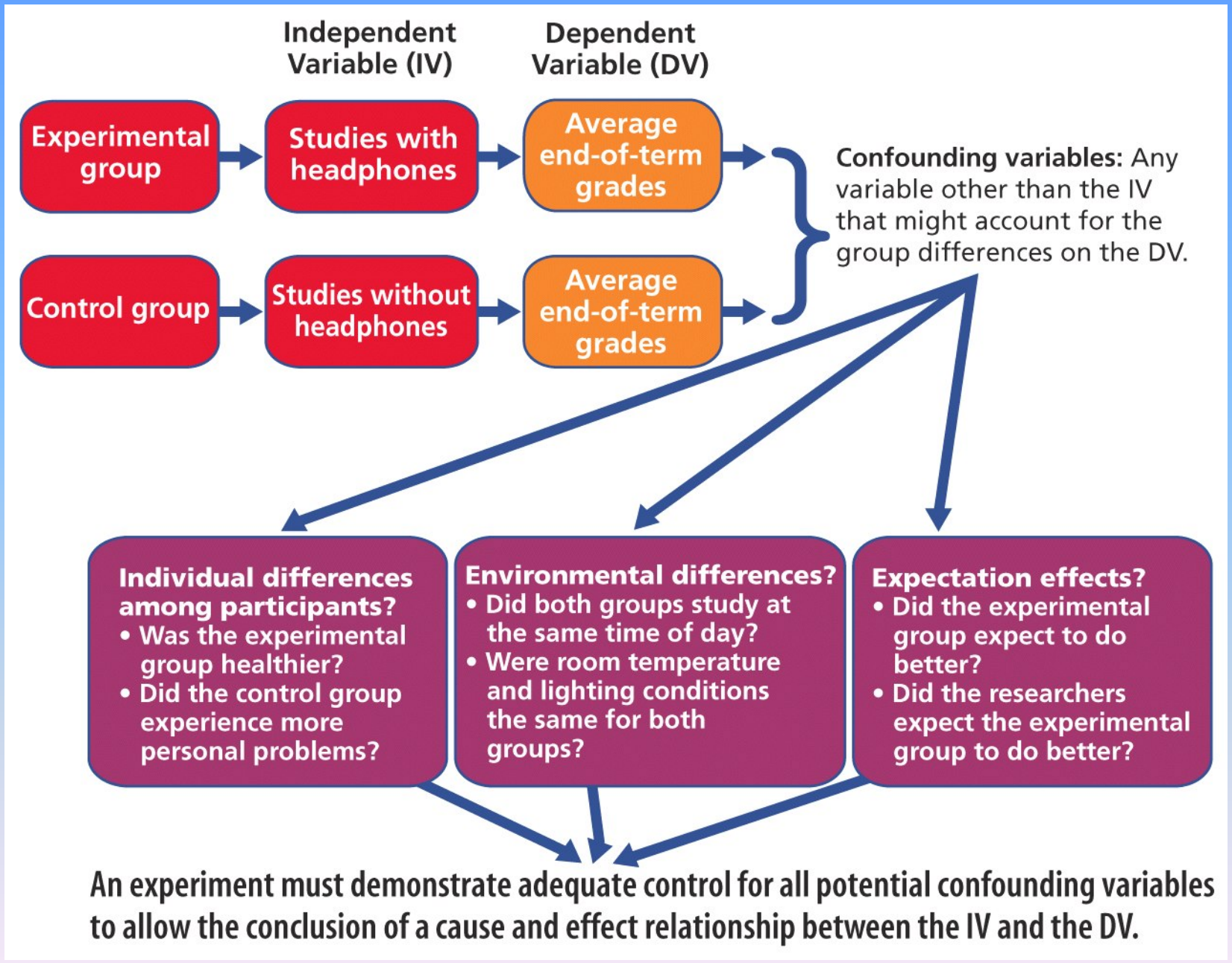
Experiments: Control for Other Confounding Variables

Confounding Variables: Environmental Differences

- Any differences in the experiment's conditions--between the experimental and control groups
- Differences include temperature, lighting, noise levels, distractions, etc.
- Ideally, there should be a minimum of environmental differences between the two groups.

Confounding Variables: Expectation Effects

- Any changes in an experiment's results due to the subject anticipating certain outcomes to the experiment


Independent Variable (IV)
Dependent Variable (DV)
Experimental group
Studies with headphones
Average end-of-term grades
Control group
Studies without headphones
Average end-of-term grades
Confounding variables: Any variable other than the IV that might account for the group differences on the DV.
Individual differences among participants?
• Was the experimental group healthier?
• Did the control group experience more personal problems?
Environmental differences?
• Did both groups study at the same time of day?
• Were room temperature and lighting conditions the same for both groups?
Expectation effects?
• Did the experimental group expect to do better?
• Did the researchers expect the experimental group to do better?
An experiment must demonstrate adequate control for all potential confounding variables to allow the conclusion of a cause and effect relationship between the IV and the DV.

Blind procedure

- An experimental procedure where the research participants are ignorant (blind) to the expected outcome of the experiment
- Sometimes called single blind procedure

Double Blind Procedure

- An experimental procedure where both the research participants and those collecting the data are ignorant (blind) to the expected outcome of the experiment

Placebo

- A non-active substance or condition administered instead of a drug or active agent
- Given to the control group

Placebo Effect

- Play “The Placebo Effect: Mind-Body Relationship” (9:14) Segment #3 from The Mind: Psychology Teaching Modules (2nd edition)

Module 2: Research Strategies

Experiments: Data Analysis

Statistically Significant

- Possibility that the differences in results between the experimental and control groups could have occurred by chance is no more than 5 percent
- Must be at least 95% certain the differences between the groups is due to the independent variable

Experiments: Replication

Replication

- Repeating the experiment to determine if similar results are found
- If so, the research is considered reliable.

TABLE 2.2 EXPERIMENTS STEP BY STEP

1. Develop the *hypothesis*.
2. Create *operational definitions* for the *independent and dependent variables*.
3. *Randomly select* a sample of participants from the population.
4. *Randomly assign* the participants to the *experimental and control groups*.
5. Expose the experimental group, but not the control group, to the IV. If necessary, use a *placebo* with the control group to balance expectations.
6. Control for other *confounding variables* by using a *double-blind procedure* and treating both groups the same except for exposure to the IV.
7. Learn the impact of the IV by measuring the DV for both groups.
8. Use *statistical analysis* to discover whether the difference in the DV between the two groups is likely to have been caused by the manipulation of the IV.

Experimental Method

- Play "Tackling a Killer Disease" (10:07) Segment #1 from Scientific American Frontiers: Video Collection for Introductory Psychology (2nd edition)

Module 2: Research Strategies

Ethics

Ethics: Human Research

(Four Basic Principles)

1. Informed Consent

- Participants must be informed, in advance, about:
  - the general nature of the research, and
  - any potential risk.
  - Participants must have the right to refuse participation or withdraw at any time.

2. Right to be Protected from Harm and Discomfort

- Studies involving harm or discomfort may be conducted only under certain circumstances, and only with the informed consent of the participants.

3. Right of Confidentiality

- Individual data about research participants should never be discussed or released.

4. Right to Debriefing

- Participants have a right to receive a complete explanation of the research at the end of the study.
- This is extremely important if the research involves deception.

Ethics: Animal Research

Reasons for Animal Research

- Interest in animal behavior as a topic of study
- Data from animal studies may apply to humans.
- Easier to do some type of studies (genetics) due to the shorter life span of animals

Reasons for Animal Research

- Easier to exercise more control over experiments with animals as compared to humans
- Procedures that are not ethical to perform on humans may be considered acceptable when performed on animals

Care of Animals used in Research

- Animals used in research must:
  - Have clean housing with adequate ventilation
  - Have appropriate food
  - Be well cared for

The End

Name of Concept

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Name of Concept

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