Cheat Sheet: Research in Psychology

Essential Concepts

The Scientific Method

- Scientists are engaged in explaining and understanding how the world around them works, and they are able to do so by coming up with theories that generate hypotheses that are testable and falsifiable. Theories that stand up to their tests are retained and refined, while those that do not are discarded or modified.
- Ethics in research is an evolving field, and some practices that were accepted or tolerated in the past would be considered unethical today.
- Researchers are expected to adhere to basic ethical guidelines when conducting experiments that involve human participants. Any experiment involving human participants must be approved by an IRB. Participation in experiments is voluntary and requires informed consent of the participants. If any deception is involved in the experiment, each participant must be fully debriefed upon the conclusion of the study.
- Animal research is held to ethical standards, minimizing pain and distress for the animals and requiring IACUC approval and regular inspections to ensure that animals are being treated humanely.

Types of Research

Descriptive Research

- Descriptive research involves any of the following: clinical or case studies, naturalistic observation, surveys, archival research, longitudinal research, and cross-sectional research. Each of these methods has its own advantages and disadvantages, that must be considered when designing a study, in order to collect the data required.

Correlational and Experimental Research

- A correlation is described with a correlation coefficient, r, which ranges from -1 to 1. The correlation coefficient tells us about the nature (positive or negative) and the strength of the relationship between two or more variables.
- Correlations do not tell us anything about causation—regardless of how strong the relationship is between variables. In fact, the only way to demonstrate causation is by conducting an experiment. People often make the mistake of claiming that correlations exist when they really do not.
- Researchers can test cause-and-effect hypotheses by conducting experiments. Ideally, experimental participants are randomly selected from the population of interest. Then, the participants are randomly assigned to their respective groups. Sometimes, the researcher and the participants are blind to group membership to prevent their expectations from influencing the results.
- In an ideal experimental design, the only difference between the experimental and control groups is whether participants are exposed to the experimental manipulation. Each group goes through all phases of the experiment, but each group will experience a different level of the independent variable. Once data is collected from both groups, it is analyzed statistically to determine if there are meaningful differences between the groups.

Statistical Thinking

- Statistical analyses play a crucial role in psychology research, as they allow researchers to analyze and interpret complex data and draw meaningful conclusions. Statistical analyses can help to:
    - test hypotheses and determine whether observed results are statistically significant.
    - identify relationships between variables, such as the relationship between parental involvement and child academic achievement or the correlation between depression and suicidal ideation.
    - generalize findings from a sample to a population. By calculating measures of central tendency (e.g., mean, median, mode) and variability (e.g., standard deviation), researchers can estimate how well their sample represents the larger population.
    - evaluate the validity and reliability of psychological measures.
- Psychologists report their research findings in peer-reviewed journal articles. Research published in this format is checked by several other psychologists who serve as a filter

separating ideas that are supported by evidence from ideas that are not. Replication has an important role in ensuring the legitimacy of published research. In the long run, only those findings that are capable of being replicated consistently will achieve consensus in the scientific community.

The Replication Crisis

- The replication crisis in psychology refers to concerns about the credibility of findings in psychological science. The term arose after findings of some key psychological research studies were difficult to replicate, meaning that other researchers were unable to reproduce the same results. The crisis has led to a reevaluation of the methods used in psychological research and a push for more transparency and openness in the field.

Glossary

abstract

a concise summary of a research article. It summarizes the most important features of the manuscript, providing the reader with a global first impression of the article

archival research

method of research using past records or data sets to answer various research questions, or to search for interesting patterns or relationships

attrition

reduction in number of research participants as some drop out of the study over time

cause-and-effect relationship

changes in one variable cause the changes in the other variable; can be determined only through an experimental research design

clinical or case study

observational research study focusing on one or a few people

confirmation bias

tendency to ignore evidence that disproves ideas or beliefs

confounding variable

an unanticipated outside factor that affects both variables of interest, often giving the false impression that changes in one variable causes changes in the other variable, when, in actuality, the outside factor causes changes in both variables

control group

serves as a basis for comparison and controls for chance factors that might influence the results of the study—by holding such factors constant across groups so that the experimental manipulation is the only difference between groups

correlation

relationship between two or more variables; when two variables are correlated, one variable changes as the other does

correlation coefficient

number from -1 to +1, indicating the strength and direction of the relationship between variables, and usually represented by r

correlational research

tests whether a relationship exists between two or more variables

cross-sectional research

compares multiple segments of a population at a single time

debriefing

when an experiment involved deception, participants are told complete and truthful information about the experiment at its conclusion

deception

purposely misleading experiment participants in order to maintain the integrity of the experiment

deductive reasoning

results are predicted based on a general premise

dependent variable

variable that the researcher measures to see how much effect the independent variable had

descriptive research

research studies that do not test specific relationships between variables; they are used to describe general or specific behaviors and attributes that are observed and measured

discussion

component of a research article that provides an interpretation of the findings, states their significance for current research, and derives implications for theory and practice

distribution

the pattern of variation in a set of data

double-blind study

experiment in which both the researchers and the participants are blind to group assignments

empirical

grounded in objective, tangible evidence that can be observed time and time again, regardless of who is observing

experimental group

group designed to answer the research question; experimental manipulation is the only difference between the experimental and control groups, so any differences between the two are due to experimental manipulation rather than chance

experimental research

tests a hypothesis to determine cause and effect relationships

experimenter bias

researcher expectations skew the results of the study

fact

objective and verifiable observation, established using evidence collected through empirical research

fairness

implies that all data must be considered when evaluating a hypothesis

falsifiable

able to be disproven by experimental results

generalize

inferring that the results for a sample apply to the larger population

hypothesis

(plural: hypotheses) tentative and testable statement about the relationship between two or more variables

illusory correlation

seeing relationships between two things when in reality no such relationship exists

independent variable

variable that is influenced or controlled by the experimenter; in a sound experimental study, the independent variable is the only important difference between the experimental and control group

inductive reasoning

conclusions are drawn from observations

informed consent

process of informing a research participant about what to expect during an experiment, any risks involved, and the implications of the research, and then obtaining the person's consent to participate

Institutional Animal Care and Use Committee (IACUC)

committee of administrators, scientists, veterinarians, and community members that reviews proposals for research involving non-human animals

Institutional Review Board (IRB)

committee of administrators, scientists, and community members that reviews proposals for research involving human participants

inter-rater reliability

measure of agreement among observers on how they record and classify a particular event

internal consistency

the degree to which different items on a survey that measure the same thing correlate with one another

introduction

component of a research article that provides background information about the origin and purpose of performing the experiment or study. It reviews previous research and presents existing theories on the topic

longitudinal research

studies in which the same group of individuals is surveyed or measured repeatedly over an extended period of time

margin of error

the expected amount of random variation in a statistic; often defined for 95% confidence level

mean

the arithmetic average of all data points, found by adding all of the totals and dividing by the number of data points

median

the middle value in a data set

method

covers the methodologies used to investigate the research question, including the identification of participants, procedures, and materials as well as a description of the actual procedure

mode

the most frequently occurring response in a dataset

naturalistic observation

observation of behavior in its natural setting

negative correlation

two variables change in different directions, with one becoming larger as the other becomes smaller; a negative correlation is not the same thing as no correlation

observer bias

when observations may be skewed to align with observer expectations

operational definition

description of what actions and operations will be used to measure the dependent variables and manipulate the independent variables

opinion

personal judgments, conclusions, or attitudes that may or may not be accurate

participants

subjects of psychological research

peer-reviewed journal article

article read by several other scientists (usually anonymously) with expertise in the subject matter, who provide feedback regarding the quality of the manuscript before it is accepted for publication

placebo effect

people’s expectations or beliefs influencing or determining their experience in a given situation

population

the overall group of individuals that the researchers are interested in

positive correlation

two variables change in the same direction, both becoming either larger or smaller

predictability

implies that a theory should enable us to make predictions about future events

p-value

how often a random process would give a result at least as extreme as what was found in the actual study, assuming there was nothing other than random chance at play

random assignment

method of experimental group assignment in which all participants have an equal chance of being assigned to either group

random sample

subset of a larger population in which every member of the population has an equal chance of being selected

reliability

consistency and reproducibility of a given result

replicate

repeating an experiment using different samples to determine the research's reliability

results

component of a research article that presents key findings of the research, including references to indicators of statistical significance

sample

subset of individuals selected from the larger population

single-blind study

experiment in which the researcher knows which participants are in the experimental group and which are in the control group

standard deviation

a measure of how much the data varies from the mean score

statistical analysis

determines how likely any difference between experimental groups is due to chance

statistical significance

a result is statistically significant if it is unlikely to arise by chance alone

statistics

the study of collecting and analyzing numerical data, especially for the purpose of inferring proportions in a whole from those in a representative sample

structured observation

when people are observed while engaging in set, specific tasks

survey

list of questions to be answered by research participants—given as paper-and-pencil questionnaires, administered electronically, or conducted verbally—allowing researchers to collect data from a large number of people

test-retest reliability

the degree to which the outcomes of a particular measure remain consistent over multiple administrations

theory

well-developed set of ideas that propose an explanation for observed phenomena

validity

accuracy of a given result in measuring what it is designed to measure

verifiability

an experiment must be replicable by another researcher