Research Methods

Planning and conducting psychological research

- Experiments are conducted to test whether one things, or variable, influences or causes a change in another thing, or variable

Experimental and Non-experimental research

Experimental

- Where the researcher changes a variable or group of variable to see the effect on another variable
- Variable: Any factors that can very in amount or over time (e.g stress, fear)
- Independent variable: The variable that is changed by the experimenter
- Dependent variable: The variable that is measured to determine its relationship to the changed variable
- The researcher develops a "hypothesis" that is a tentative prediction of the relationship between he independent variable and the dependent variable ('an educated guess')
- The research method is used to support or disprove a hypothesis

Non-experimental

- Often involve:
- Observation: the collection of data by carefully watching and recording the behaviours of others
- Interviews: Where the data are responses to questions
- Case studies: of individual examples of behaviour
- Correlational studies: examine the relationship between two variables
- Archival research: were repositories of old material are examined

Scientific and non-scientific research

Scientific

- involves a systematic approach to the planning, conducting and reporting of research, usually in the form of experiments
- researchers collect empire evidence or data that enables them to draw conclusions, based on the experiments

Non-scientific

- Include things such as astrology, numerology, graphology to explain and predict human behaviour
- These re not based on science and they are often labelled "pseudoscience" to indicate that they do not have any scientific foundation

Participant selection

- Sample: A smaller subset of the population
- Population: The larger group of participants from which our sample is drawn.
- Provided the participants in the sample are representative of the population then the findings from the sample can be confidently applied to the population
- If the sample is biased (unrepresentative), then the findings could not be generalised to the population

Ethics in psychological research

Role of the experimenter

- In experiments researchers tend to work with "aggregated data" which means that the results represent the group average rather than individual scores
- Experiments assume that an experimenter will be objective to ensure that the research has no effect on the behaviour being observed or recorded or on the results
- The "experimenter effect" tells us that the experimenter's values and beliefs can influence the research process at any point
- To counter this, it is common practice for researchers to acknowledge any such expectation and potential biases and to put in place strategies to minimise these as far as possible through physical and emotional distance from study

Participants' rights

- Privacy

• The right of protection from unwanted intrusion by government or other people into one's affairs.
• It refers to the collection, storage and sharing of personal information

- Anonymity

• The protection of people's identity through not disclosing their name or not knowing it.

- Confidentiality

• Resides in the relationship between a professional and their patient, and refers to the degree of secrecy attached to the information given by the patient or client.
• Based on the understanding that information given by the patient will not be disclosed to anyone, unless the patent consents to the disclosure and under exceptional, usually legal, circumstances.

- Voluntary participation

• Participants must not be pressured or coerced to participate in any way. This means they cannot be required to participate in order to pass a course

- Withdrawal rights

• Participants have the right to withdraw from the research at any stage and for any reason and they must be informed of this before they give consent

Informed consent

- Researchers must get informed consent from participants
- This means that those taking part in any study should know why it is being carried out and eat they will be expected to do
- If telling participants the true purpose of the study before it is carried out would defeat the purpose of the study, then the researchers must make sure that participants do not experience any distress and they must be fully informed about the study after it is completed
- In situations where he participants cannot give informed consent because they are too young to do not have the intellectual ability to understand what they are being told, then consent must be obtained from those who are legally responsible for them, such as parents or guardians

• Participants must agree to participate in research studies of their own accord
• They must participate voluntarily and must not be coerced into consenting to participate through bribery or offers of rewards, or through threats such as failure on a course
• They must also be informed that they can withdraw from the study at any time without any patently, will suffer no disadvantage and do not need to give a reason.

Deception

- In some circumstances, psychologists choose to hide the real reason for the research in order to reduce the likelihood that participants will behave differently
- Under such "deception" researchers must debrief the participants after the study and explain the real reason for the study and why deception was necessary

Professional conduct

- Any psychological, medical or scientific research work in Australia with patents must comply with the most recent update of the "National statement on Ethical Conduct in human research"
- Psychologist also need to comply with the "Australian psychological Society's code of Ethics" which has a section on research.

• Both of these documents explain the professional code of conduct required of psychologists as they undertake research in Australia
• These documents require researchers to act according to agreed- upon principles for the ethical conduct of psychological research
• In Australia the fundamental principle in scientific research with humans is "beneficence": the benefits to the person must outweigh any risks

- All institutions where research with humans is undertaken have a Human Research Ethics committee which approves all research involving humans
- Detailed applications for research must be submitted for approval and the benefits (and risks) of the research need to be justified
- The welfare of the human participants must not be compromised
- The same, or different committee will also deal with applications to conduct research with animals which is also governed by various codes of ethics

Difference between sample and population data
- The sample selection must reflect the characteristics of the population that are of interest and under study to ensure that any results from the study can be generalised or applied to the population
- Representative sample: The sample drawn is the same as, or at least equivalent to the population from which it was drawn
- Random sampling: One way of obtaining a representative sample
• This type of sample makes sure every member of the study population has an equal chance of being selected to participate in the study
• This can be done in a number of ways such as: names selected from a roll, lottery procedure, drawing names out of a hat etc.

Features of experimental research methods
<u>Independent and dependent variables</u>
- Independent variable: The variable that is changed by the experimenter
- Dependent variable: The variable that is measured to determine its relationship to the changed variable (May or may not change as a result of the IV)

<u>Operational hypothesis</u>
- Operational hypothesis: those that are guiding current research- they are predicted answers to a proposed research question (tentative prediction of the relationship between the IV and DV)
- Null hypothesis: predicts that there will be no change in the DV after the manipulation of the IV
- Experimental hypothesis: predicts that change or difference will occur as a result of the manipulation of the IV

<u>Controlled and uncontrolled variables</u>
- Controlled variable: a variable that is not changed throughout the experiment to ensure that the changes observed are the result of the IV
- Uncontrolled variable: A variable that is allowed to stay random as it would have no predicted effect on the outcome

<u>Other variables:</u>
- Extraneous: Can cause an effect
- Confounding: Has caused an effect

<u>Experimental and control groups</u>
- Experimental group: those in the experimental group are subjected to the manipulation of the IV while those in the control group are not exposed to the IV
- Control group: provides a standard against which the behaviour of the experimental group can be compared in order to assess whether the IV has had an affect or caused a change in the DV
• The experimental and control groups need to be as similar as possible in characteristics that might influence the DV
• The groups should also be treated the same, except for the application of the IV with the experimental group

<u>Placebo and experimenter effects</u>
- Placebo: a dummy pill or a harmless substance given as if it were a treatment
• Used to control the effects of participant expectation

- Experimenter effects: The experimenters own personal variables as well as his or her expectations and behaviours that may bias results due to inaccurate observation, recording or interpreting data, or there may be simple bias in the way the experiment is presented to the participants

Reliability and Validity
- Reliability: They must be consistent within themselves and across time
• Internal consistency: Provided by the split- half method. The participant should respond in the same way to the first half than the second half. Correlation to responses in the questionnaire itself
• Test-retest reliability: involves comparing how people performed on a test at one time with how they performed on it some time later

- Validity: They must measure what the test developer intends them to measure
• Face validity: The items appear to be measuring what they say they are measuring
• Construct validity: examine whether the test items are in keeping with the constructs on which the test was based
• Concurrent validity: Comparing people's performance on the scale we are interested in with their performance on one that we already know about, and look at the strength of the relationship between them. Scores on a questionnaire are correlated with an external variable that reflects the same construct.
• Predictive validity: Extent to which it can predict other attributes or behaviours thought to be related to the constructs tested.

Longitudinal and cross-sectional design
- Cross-sectional methods: Take into account age-related developmental changes by comparing children of different ages
• Cohort effect: A "cohort" is defined as a group of people of the same age who have experienced the same cultural conditions and environmental events. The cohort effect describes the way in which we cant be sure that age differences are due to developmental changes
• strength: quick and easy, cheap
• limitation: cohort effect

- Longitudinal methods: Study the same group of people at different points in time
• Strength: No concern over cohort effects
• Limitation: very costly, time consuming, can loose participants over time (due to death etc)

Features of non- experimental research methods
Case Studies
- An in-depth, direct behavioural observation of a single case or situation
- Provide the opportunity for detailed knowledge about a single 'case' or a small number of related 'cases'
- The case is studied in context and uses a variety of data collection techniques including observation and interview
• Strengths: detailed knowledge
• Limitations: time consuming

Survey
- Researcher gathers self-reported data from participants who, ideally, have been randomly selected
- Surveys usually take the form of a questionnaire in which pre-determined answers are provided as alternatives
• Strengths: quick to administer
• Limitations: low response rate, data affected by the predisposition or mood of respondent on the day

Correlational studies
- Those that look at the relationship between two or more variables that involve assessing the degree and the type of relationship between these variables

- If there is a relationship between the variables, it is not necessarily a causal ('cause and effect') one.
- Correlational studies are generally used in cross-sectional studies look at a number of variables at a single point in time, or they can be used in prediction studies such as academic scores from one time to another

• Strengths: raise alternative hypothesis that can then be tested in research using experimental design that can allow cause to be examined
• Limitations:

Archival research

- Involves the examination of old, usually written, material found in places like libraries, law courts etc.
- Archival research is often used by historians and writers who reanalyse records to better understand events that happened in the past.

• Strengths: cheaper alternative, allows examined of data gathered over a long period of time and allows access to very large scale representative samples.
• Limitations: time consuming, effort required to understand all the factors involved with data, large knowledge and sill required to analyse the data

Behavioural variables in correlational studies

- Correlational studies are non-experimental methods to investigate the relationship between two or more variables that involve assessing the degree and type of relationship between these variables
- Correlational studies are often conducted when experimental ones would not be appropriate
- Behavioural variables in correlational studies are thus often those that pre-exist and cannot be varied as an IV
- The strength of the correlation describes the relationship (strong, moderate or weak)

• Positive correlation: high scores on one variable are associated with high score of the other variables
• Negative correlation: when the score on one variable is high it is low on the other

- A correlation does not indicate causation in most cases, often because there are other variables involved

Qualitative methods of data collection

- Qualitative data: information that is not expressed in numbers
- Self-reports, interviews, surveys and focus groups

Self reports

- When individuals are asked to comment on their own thoughts, emotions and beliefs by answering a series of questions on a particular topic
- Allows researchers to collect subjective data that cannot be overtly seen or measured and hence gain insight into the explanations behind behaviours
- There are several types of self reports: Survey, questionnaire, rating scale, interview

Interviews

- Open ended interviews: The researcher asks the participants in the study to comment on a statement or answer a question. They can answer in any way they like and the researcher records their responses
- Fixed-response interviews: The participants responses are restricted to a range of alternatives offered by the researcher (e.g yes or no)

• Structured interview: Involves predetermined questions in a pre-set order with fixed wording
• Semi-structured interview: This involves predetermined questions, but the order of asking them can be varied by the researcher depending on the circumstances and the answers that are being elicited. Wording of questions can be varied and explanations given if need. Questions can be omitted or even new ones added if required
• Unstructured interview: This involves a conversation around the researchers general area of interest. It is informal and casual but often in-depth.

Focus group
- A researcher asks group members about their ideas, perceptions, opinions and so on in a setting that is more natural than a one-on-one interview
- Often used by market researchers who want to gauge opinion about a product, but also used as a first step in a research project
- In focus groups, each discussion session is recorded and transcribed so it can be analysed to determine themes and key issues

• Strength:
• Limitation: social desirability (group members comments might be affected by the desire to give socially acceptable answers)

Objective quantitative measures in research
- Objective quantitative measures are generally physiological responses and include things such as brain waves, heart rate, body temperature and electrical conductivity of the skin
- Quantitative data – data collected through systematic and controlled procedures that is usually presented in numerical or categorical form
- Objective measure because limitations to self report e.g fitness test instead of asking participants to rate their fitness

Brain waves
- Recorded on an EEG (electroencephalogram)
- Brain waves are measured in terms of the number of waves per second (their frequency) and also in terms of the size of their peaks and troughs (their amplitudes)
- The brains electrical activity is at its highest during normal waking consciousness. At this time the brain waves are fast and small. The shape of the wave changes during the different stages of the sleep cycle

Heart rate
- Changes in our heart rate accompany changes in our level of awareness
- When we fall asleep, our heart rate slows
- Slow, deep breaths result in a lowered heart rate, Fast, shallow breathing has the opposite effects
- Heart rates can also be raised by the use of stimulants that lead to altered state of consciousness, or by anxiety and irritation

Body temperature
- Our body temperature is not as variable as our heart rate but it does change with changes in consciousness
- During sleep, temperature drops by more than one degree celsius

Electrical conductivity of the skin
- Changes in the electrical conductivity of the skin are known as the galvanic skin response (GSR)
- The GSR is measured by attaching electrodes to hair free parts of the body
- If we sweat and our skin is wet, an electrical current passes more easily then if our skin is dry
- As sweating occurs during times when we are aroused, such as when we are anxious, fearful or excited, the GSR indicates our level of arousal

Subjective quantitative measures
Checklists
- Researchers use these in observational studies with predetermined criteria to guide observations and recording responses

Rating scales
- Rating scales have been developed by psychologists for a range of abilities, attitudes, views and opinions
- They can be regarded as versions of questionnaire or interviews

- These tests provide a scale on which an individuals standing on an issue can be measured and they are commonly used for attitude measurement, although the same principle apply to the development of any rating scale

- Likert scale
• Focuses on the direction of an attitude
• About 20 questions/ statements
• Respondent indicates their degree of agreement/disagreement on a five-point scale (War is sometimes necessary to maintain justice (*strongly agree, agree, neither, disagree, strongly disagree*)
• Half the attitudes are negative and half positive

Types of sampling

Stratified sampling
• Involves dividing the population into groups, or strata, where each group has a particular characteristic
• It is usual to have the numbers of each group reflecting the relative numbers in the population

Convenience sampling
• Quick and easy way of selecting participants
• Involves selecting participants based on the researchers accessibility to them, or to the participants availability
• Advantage: it is convenient, does not require forward planning, quick to administer

Random Sampling
• Ensures that every member of a population has an equal chance of being selected for the sample being used in the study (e.g pulling names out of a hat)
• Advantage: very quick, inexpensive as sampling procedures are easy to set up
• Not biased- every member of the population has an equal chance of being selected to be part of the sample

Experimental research designs

Independent-groups design
- Involves randomly allocating the members of the sample to either the control or experimental group
- Advantages
• Very quick and easy to administer
• Allows us to research large numbers of participants fairly easily
- Disadvantages:
• There may be participant differences between the groups
• Does not effectively minimise differences in participant characteristics between the groups

Matched-Participants design
- Seeks to eradicate participant differences
- Involves pairing each participant based on a certain characteristic that they share
- Once participants have been matched, you randomly allocated one to the control group and one to the experimental group
- Advantages:
• Helps to achieve an even spread of participant characteristics between the groups and helps to minimise extraneous variables due to participant differences
- Disadvantages:
• Involves a pre-test to match participants on particular characteristics and is therefor more time consuming than other designs
• One participant may drop out during experiment so therefor the other participant from the pair must be removed from the study

Repeated-measures design

- Implemented by using only one group of participants and exposing that group to both the control and experimental conditions
- As the same participants are used in both the control and experimental conditions, they are obviously completely identical in characteristics and abilities
- Eliminates impact of participant differences as an extraneous variable but it does create a different problems known as "order effects"

• Order effects: occur when there is a change in results due to the sequence in which two tasks are competed (that is, due to the order in which participants complete the control and experimental conditions)
• The change in results may be an increase in performance due to knowledge or experience in task, or may be a decrease in performance due to boredom or fatigue with carrying out a task more than once
• An individuals experience may therefor have an impact on the results of the study and this would be an extraneous variable

- One way to minimise the impact of order effects is to use "counterbalancing"

• Counterbalancing involves dividing the group of participants in half an arranging the order of the conditions so that each condition occurs equally as often in each positions (that is, it involves exposing half of the participants to the control condition first and the control condition second)
• This counterbalances the potential impact of order effects on the results
• Counterbalancing does not eliminate order effect occurring, but it removes the influence that order effects have on results

Processing and evaluating psychological research

Methods of displaying quantitative data

Tables

- Use clear headings
- Use headings and sub headings that highlight research questions
- Specify what the numbers represent

Graphs

- Line graphs

• Show the relationship between two variables, things that can vary (change) in some way, such as an amount

- Histograms or bar graphs

• bar graphs show unpontinuous information
• Histograms represent how one variable changes in relation to another (bars touch each other)

- Frequency polygons

• Looks like a line graph, but while line graphs can be used to show a relationship between any two variables of interest, frequency polygons are only used to show information about frequency (how something occurs)
• advantage: several sets of data can be displayed in one graph

- Pie charts

• Show the proportions of data

Measures of central tendency

Descriptive statistics

- Mode: most frequently occurring variable
- Mean: the average score
- Median: the middle variable
- Range: difference between the highest and lowest score

Measures of dispersion

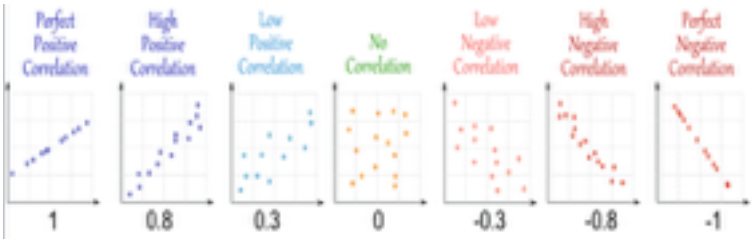
- The standard distribution is called the "bell curve" or "normal distribution"
- Symmetrical around mean, Denser in centre and less dense at tails, mean/median/ mode are identical
- Best to use variation of standard deviation
- The variance of scores tells us how spread out the scores are around the mean
- Psychologists prefer to use the standard deviation to describe the spread of a group of scores (it is the squared root of the variance and represents the average amount by which scores differ from the mean)

Role of probability

- When testing for statistical significance, these are the comparisons that we make- between the distribution of our scores and that of the wider population
- If our results are more extreme then those assumed by a normal distribution, or by chance, then we conclude that our results are statistically significant
- p value >0.05= probability due to chance is less than 5%
- p value <0.05= Results are likely due to the independent variable, hypothesis accepted, conclusions can be drawn.

Use of correlation to establish association between variables

- Correlation: statistical term that tell us about the relationship between two measures
- Correlation coefficient: number the describes the strength and direction of the relationship between two variables and be described as positive or negative
- Bivariate correlation: Only two variables
- Multivariate correlation: more than two variables



Sources of error in data

Participant sources of error

- Hawthorne effect: Refers to the finding that simply knowing that they are a part of a study can lead participants to change their behaviour
- Placebo: A neutral substance that is presented in such a way that it looks like "the real thing"- participants will not know which one they received, that is, they will be 'blind' to the group they are in, which is known as the "single-blind procedure".
- Any differences in the effects of the drug should then be due to the drug itself, rather than to beliefs about the treatment

Experimenter sources of error

- Experimenters may also influence participants behaviour
- An "experimenter effect" can occur when the experimenters actions, such as smiling or shaking hands, affect how the participants respond, especially if one group is treated differently from another
- "Experimenter bias" can also occur when the person measuring the dependent variable knows which group the participant is in.
- This has shown that verbal responses may be interpreted in a particular way and so on without intending to do so
- Differential treatment of groups can leads to the dependent variable being affected by factors other than the independent variables, and incorrect conclusion being reached.

- Experimenters use the “double-blind procedure” where neither the participants now the person collecting the data knowns which group the participant is in.
• This required an independent person to allocate participants to the experimental or control group
• The researchers desire for the treatment to work does not lead to bias in the measurement of outcomes
• Only after the data has been collected is the researcher made aware of which group each participant was in.

- A simple way of reducing differences between experimental and control groups is through the use of random allocation
- Random allocation is used to allocate participants to groups

Source of Error	Description	Ways to reduce it
Demand characteristics	Participant responds in a way they think the experimenter will be pleased	Cross-checks, double blind procedures
Experimenter effect	The experimenters behaviour may change the participants reaction	Double-blind study
Placebo effect	Participant changes the behaviour in the belief that treatment is working	
Sampling error	Sample of participants is biased	Select participants randomly
Order effects	Impact of the order of items/ tasks impacts results	Counterbalancing: present items in a different order
Observer bias	Observer sees what they want or expect to see	Use a systematic approach to record or process information

<u>Types of Sampling</u>
- Stratified random sampling:
• Involves dividing the population into groups, or strata, where each group has a particular characteristic
• It is usual to have the numbers of each group reflecting the relative numbers in the population

- Proportionate sampling:
• The proportions of the groups would differ according to the representation in the general population

- Disproportionate sampling:
• Occasionally used where small, sometimes rare, groups are oversampled to ensure there is at least some representation of the stratum

- Snowball sampling:
• Used in qualitative research
• The researcher identifies particular individuals of interest who are interviewed, and who then provide names of others of interest in the population who may consent to being interviewed for the study.

- Convenience sampling:
• Quick and easy way of selecting participants
• Involves selecting participants based on the researchers accessibility to them, or to the participants availability

• Advantage: it is convenient, does not require forward planning, quick to administer

- These sampling techniques reduces sources of data error and reduce the likelihood of error when generalising the results from the sample to the wider population

- Placebo effect:
• It is shown that participants who take inactive substances or undergo useless procedures may feel much improved, provided that they do not know that the treatment is fake
• The placebo effect is not just due to psychological processes

- A more rigid form of double-blind studies can be found in "Randomised controlled trials (RCTs)
• Provide the best

Concept of statistical significance
- Refers to the significance of the difference between two scores (That is, whether we can attribute the results to the IV or to merely chance alone)
- Provides statistical proof of a causal relationship, yes the IV does cause the DV to change!
- When testing for statistical significance we make comparisons between he distribution of our scores and that of the wider population
- If the results are more extreme (at either end of the distribution) than those assumed by normal distribution, or by chance, then we conclude that the results are statistically significant
- Statistical significance is also used to indicate whether a difference between the results for the experimental group and the control group is real, that is, due to the independent variable and not simply due to chance.
• Researchers accept that a difference is a true difference due to independent variable when the probability is due to chance 5 times or fewer in 100 repetitions of the same study. This results in a P-value of 0.05 or 5% chance that the difference between the groups score was due to chance.
- Some tests of significance are:
• T-tests
• Chi-squares

If $p < 0.05$:
- Results are statistically significant Results are highly likely to be due to the IV
- Hypothesis accepted; conclusions may be drawn.

If $p > 0.05$
- The results are not statistically significant and the results are likely to be due to chance and not the IV.
- Therefore the hypothesis IS rejected! No conclusions can be drawn.

It is not correct to draw a conclusion, all that can be said is that a correlation lists between to the two variables
• Correlation does not mean causation