

# RESEARCH METHODS

LECTURE 2: EXPERIMENTAL AND NON-  
EXPERIMENTAL DESIGNS

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## STUDY DESIGN

- Often several potential ways of exploring a psychological question
- Have to weight up the benefits and problems of each possible approach
- Must make sure the design chosen will enable you to answer your research question, and reject or accept your hypotheses

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## EMPIRICISM I.E. A SCIENTIFIC APPROACH

- Definable subject matter
  - What are you interested in?
- Theory construction
  - An explanation of a particular behaviour/cognitive process
- Hypothesis testing
  - A testable statement which makes a prediction about that behaviour/cognitive process
- Empirical methods
  - Ways of collecting data to see if your hypothesis/prediction is correct & if your theory is supported.

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## EXPERIMENTAL DESIGNS

- When we are looking for **differences** between two or more groups, we will normally use an **experimental design**
- Important in exploring causal relationship between variables
- Can identify whether one type of variable affects another
  - *Cause and effect!*

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## EXPERIMENTAL DESIGNS

- We can systematically alter the level of an IV to see if it effects the DV
- Simple experimental designs often reflect key demographic differences
  - E.g.,

### Gender differences in body image

Two groups:  
Male / Female

### Age differences in prejudice

Three groups:  
18-30 / 31-40 / 41 and over

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## EXPERIMENTAL DESIGN

- Or, participants can be (randomly) allocated to different groups whereby the researcher manipulates the IV

### Memory recall task

Two **groups**:  
1. Distraction  
2. No distraction

OR

### Attitudes towards smoking

Two **conditions**:  
1. Before and 2. after reading an anti-smoking message

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## CHARACTERISTICS OF EXPERIMENTS

1. Researcher manipulates (controls) one or more variables
2. Researcher measures whether this manipulation influences other variables
3. Research attempts to control extraneous factors that might influence the outcome of the experiment

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## VARIABLES - RECAP

### IV's

- Can be manipulated/controlled by the researcher

### DV

- Dependent on the IV

### Extraneous

- Any variable that is not the IV that could have affected the DV (but may or may not have been accounted for in the initial study design)

### Confounding

- A variable that causes confusion in understanding the relationship between two variables. Aim as much as possible to eliminate these in experimental research through controlled conditions

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## PLANNING (EXPERIMENTAL) RESEARCH

1. Find an idea
2. Convert into a specific hypothesis
3. Define and measure variables
4. Identify participants
5. Select a strategy and design
6. Conduct study
7. Evaluate data
8. Report findings
9. Refine or reformulate hypotheses

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## RECAP: PLANNING (EXPERIMENTAL) RESEARCH

1. Find an idea  
↓
2. Convert into a specific hypothesis



3. Define and measure variables
4. Identify participants
5. Select a strategy and design
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## MOVING FROM IDEAS TO HYPOTHESES

- We are all scientists
  - We often use scientific reasoning without even realising it!
- One day, you're about to go to bed and leave your phone on charge when you notice the charger isn't working




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## MOVING FROM IDEAS TO HYPOTHESES

- Could there have been a power cut?
  - Test by switching something else on and off to see if it works
- Is there a problem with the plug socket?
  - Test by plugging the charger into another socket to see if it works
- Has the fuse blown?
  - Test by changing the fuse and seeing if it works

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## WHAT IS A HYPOTHESIS?

- A hypothesis = a claim about the world
  - Often based on prior research/knowledge
- Simple hypothesis testing
  - Think of a possible logical reason for the fault and test it
    - ... in isolation!
  - We would never change the fuse AND plug the charger into another socket
    - We wouldn't know which of the two possible reasons were responsible for making the charger eventually work!

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## TYPES OF DESIGN

EXPERIMENTAL

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## TYPES OF DESIGN

Between-subjects

Within-subjects

Mixed design (bit of both!)

- I. Are you exploring differences between two (or more) groups?

- E.g., a research study exploring differences in perceptions of body image between males and females.

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## TYPES OF DESIGN

Between-subjects

Within-subjects

Mixed design (bit of both!)

2. Are you exploring changes within the same group of participants?

- E.g., a research study exploring changes in people's attitudes towards gambling when given an editorial article on gambling in society.

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## BETWEEN- OR WITHIN-SUBJECTS DESIGN?

- Sounds simple – but this is one of the areas that students get most confused about!




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## BETWEEN-SUBJECTS

Are you exploring differences between two (or more) groups?

- E.g., a research study exploring differences in perceptions of body image between males and females.

Participants are **either** in one group or another group

MALE

OR

FEMALE

Often randomly assigned to one group or another (not the case with gender)

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## WITHIN-SUBJECTS

Are you exploring changes within the same group of participants

– Can either be over time or before/after experimental manipulation or intervention?

- E.g., a research study exploring changes in people's attitudes towards gambling when given an editorial article on gambling in society.

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## WITHIN-SUBJECTS

- The same participants take part in **all conditions**



- When there are two conditions running at the same time (so not including an intervention study, for example), the order of the conditions should be randomly assigned to participants

– **Counterbalancing**

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## MIXED DESIGN

- When you have a between-subjects variable AND a within-subjects variable..
- More on this next year!!

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# NON- EXPERIMENTAL DESIGNS

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## PROBLEMS WITH THE “SCIENCE” OF PSYCHOLOGY

### Objectivity

- impossible to achieve?
- The social nature of what we study = subjective

### Experimenter bias

- We are influenced by our own expectations & beliefs
- We may act in a certain way that influences the thing we are studying

### Demand characteristics

- Participants are problem-solvers
- Will try and act in a way they think is expected of them – may not be their normal behaviour

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## PROBLEMS WITH THE “SCIENCE” OF PSYCHOLOGY

### Representativeness

- can we “generalise” from small samples to the wider population?
- Does our sample represent all sections of the population we are interested in?

### Artificiality

- Is the way people behave in a laboratory experiment the same as they would behave normally?

### Validity

- Ecological/external validity – is the study situation similar to the real-life situation of interest?
- Internal validity – the degree of scientific control within a study

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## NON-EXPERIMENTAL DESIGN

- Non-experimental methods investigate variables that exist among people irrespective of any researcher intervention
- Often using correlation, or by the investigation of existing group differences
- In these studies, no IV is manipulated

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## NON-EXPERIMENTAL METHODS

- Some research questions **do not suit** an experimental design
- We can still use quantitative methods (numbers), but we can employ a non-experimental method to answer our research questions
  - For example, correlational design

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## NON-EXPERIMENTAL METHODS

### Correlational Research

- ✓ Can establish generalisation outside the laboratory
- ✓ Can generate ideas for further laboratory study
- ✓ Allows the examination of variables that may not be practical or ethical to study in the laboratory

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## CORRELATIONAL DESIGN

- Considered to be a non-experimental design
- Measuring not manipulating...

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## CORRELATIONAL DESIGN

Three components to correlation research:

1. Researcher measures one variable (X)
2. Research measures a second variable (Y)
3. Researcher statistically determines whether (X) and (Y) are related

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## CORRELATION EXAMPLE

*Is there a relationship between levels of self-esteem and depression?*

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## CORRELATION EXAMPLE

*Is there a relationship between levels of self-esteem and depression?*

Not manipulating anything, simply measuring levels of each variable

Self-esteem (X)



Level of depression (Y)




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## CORRELATION EXAMPLE

- So what can we say about these two variables?

*We can say that levels of self-esteem and depression are related*




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## CORRELATION EXAMPLE

- What **can't** we say?
- We are not exploring whether one **causes** the other, so we cannot determine causality.

Low self-esteem (X)

could cause



Higher depression (Y)

OR

High depression (X)

could cause



Low self-esteem (Y)

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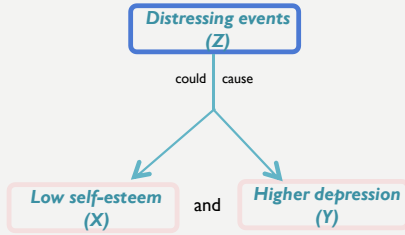
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**OR!**




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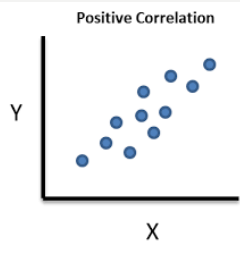
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## TYPES OF CORRELATION/RELATIONSHIP



Higher scores on one variable are associated with higher scores on a second variable

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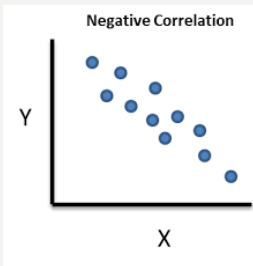
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## TYPES OF CORRELATION/RELATIONSHIP



Higher scores on one variable are associated with lower scores on a second variable

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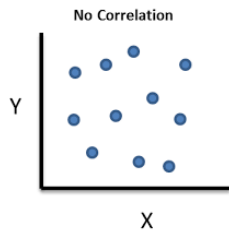
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## TYPES OF CORRELATION/RELATIONSHIP



The two sets of scores are completely unrelated

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## QUASI-EXPERIMENTS

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## QUASI-EXPERIMENTS

- Quasi-experimentation takes place in a number of different fields of psychology  
e.g., Social and Applied psychology
- Face the dilemma of wishing to research in realistic everyday settings, but recognise the lack of control this can involve

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## QUASI-EXPERIMENTS

- The term **quasi-experiment** refers to well-controlled research designs that are 'almost' experiments
- However, they lack two of the essential features of a true experiment
  1. Random allocation of participants to conditions
    - Without this we have non-equivalent groups
  2. Full experimenter control over the IV

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## EXAMPLES

Researchers want to look at a group of workers and determine the numbers of errors they make during their work shift. They want to include levels of stress as a variable in their study.

4 ways they can assess this one idea...

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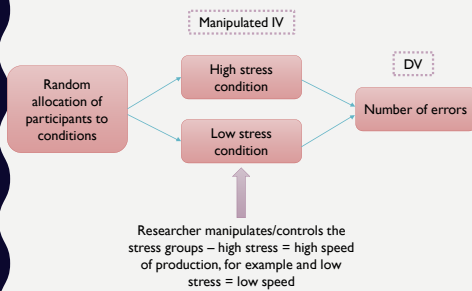
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## 1. TRUE EXPERIMENT




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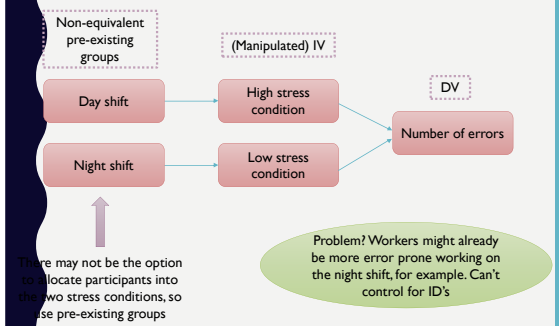
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## 2. QUASI-EXPERIMENT




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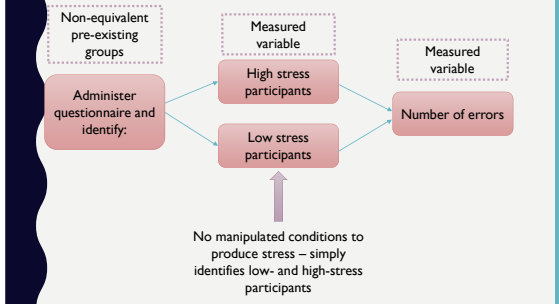
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## 3. GROUP DIFFERENCE STUDY




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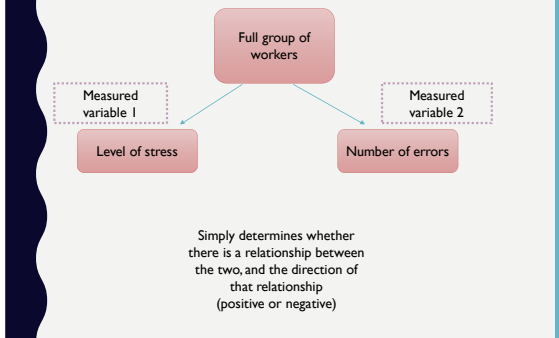
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## 4. CORRELATION




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## SUMMARY

- Research questions can be explored in a number of different (quantitative) ways
  - Experimental and non-experimental
- Strengths and limitations to each
  - Main point is to answer the research question(s) as best you can using the most effective method!

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## TODAYS WORKSHOP

### Report Writing

11-12: Counselling and Psych students

12-1: Psych only students

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## NEXT WEEK

- **Lecture:** validity in psychological research
- **Workshop:** psychological tests and measurement scales

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**ANY QUESTIONS?**



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