

Getting Started

Objectives

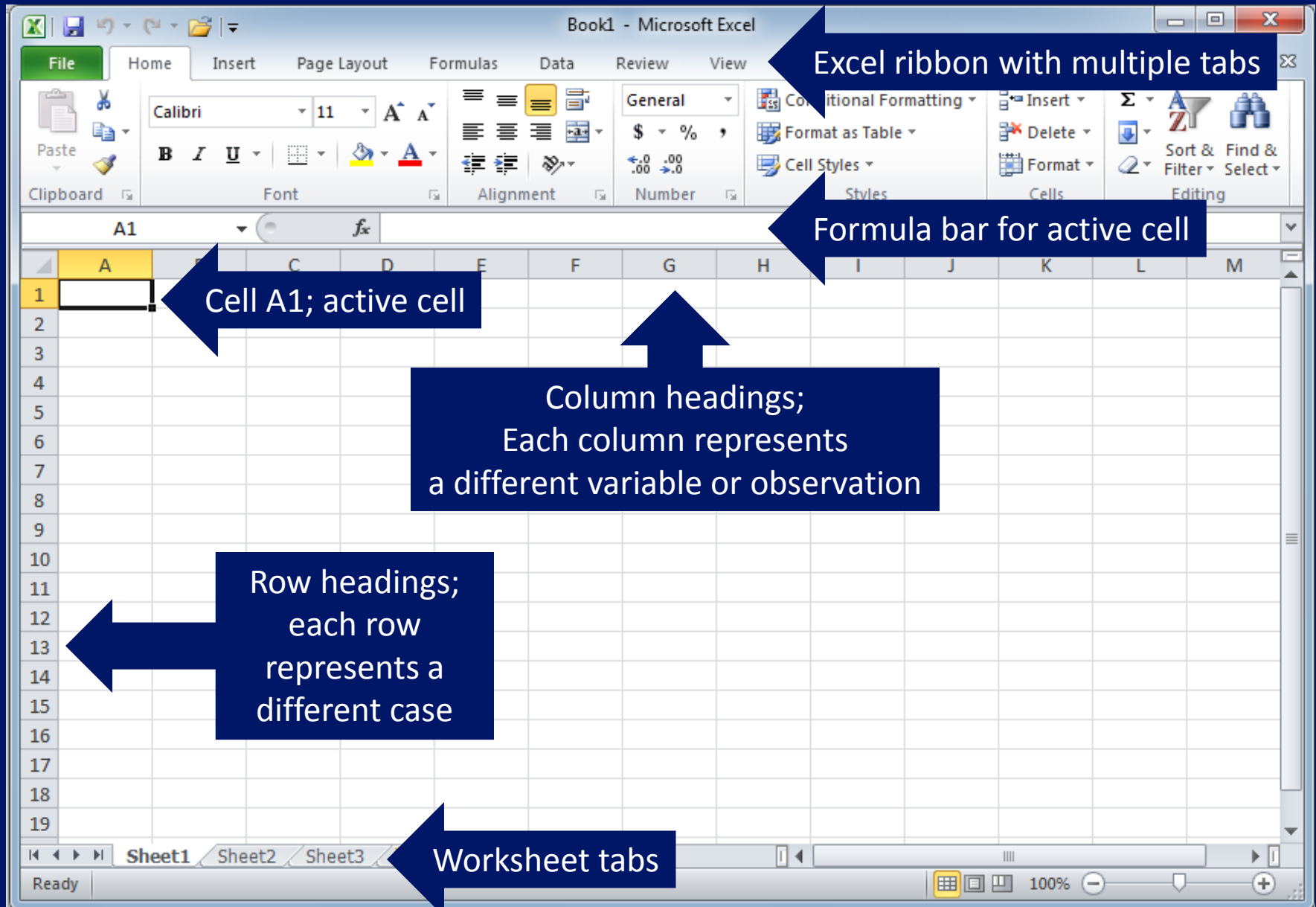
```
graph TD; A[Objectives] --- B[Understand the Excel worksheet layout]; A --- C[Enter data in an Excel worksheet]; A --- D[Perform arithmetic operations];
```

Understand
the Excel
worksheet
layout

Enter data in
an Excel
worksheet

Perform
arithmetic
operations

Launch Excel and open a new Excel Workbook (Windows version screenshot).



Workbook1

Search in Sheet

Home Layout Tables Charts SmartArt Formulas Data Review

Edit Font Alignment Number Format Cells Themes

Paste Calibri (Body) 12 B I U Wrap Text General Conditional Formatting Styles Actions Themes

A3

Cell A3; active cell

To make a cell active, simply click on that cell.
Use the mouse or the arrow keys or the return key to move around the worksheet.
For example, if you press the return key twice or the down arrow key twice
you move the active cell two cells down.

Sheet1

Normal View Ready Sum=0

Workbook1

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Edit Font Alignment Number Format Cells Themes

Name box: B1

Formula bar: Score

Cell B1; active cell

Typically, the first step in entering data is to enter variable names in row 1. Note the name box identifies the address of the active cell and the formula bar displays the contents of the active cell.

	A	B	C	D	E	F	G	H
1	Group	Score						
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

Sheet1

Normal View Enter Sum = 0

Workbook1

Search in Sheet

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Edit Font Alignment Number Format Cells Themes

Name box: B8

Formula bar: 38

Cell B8; active cell

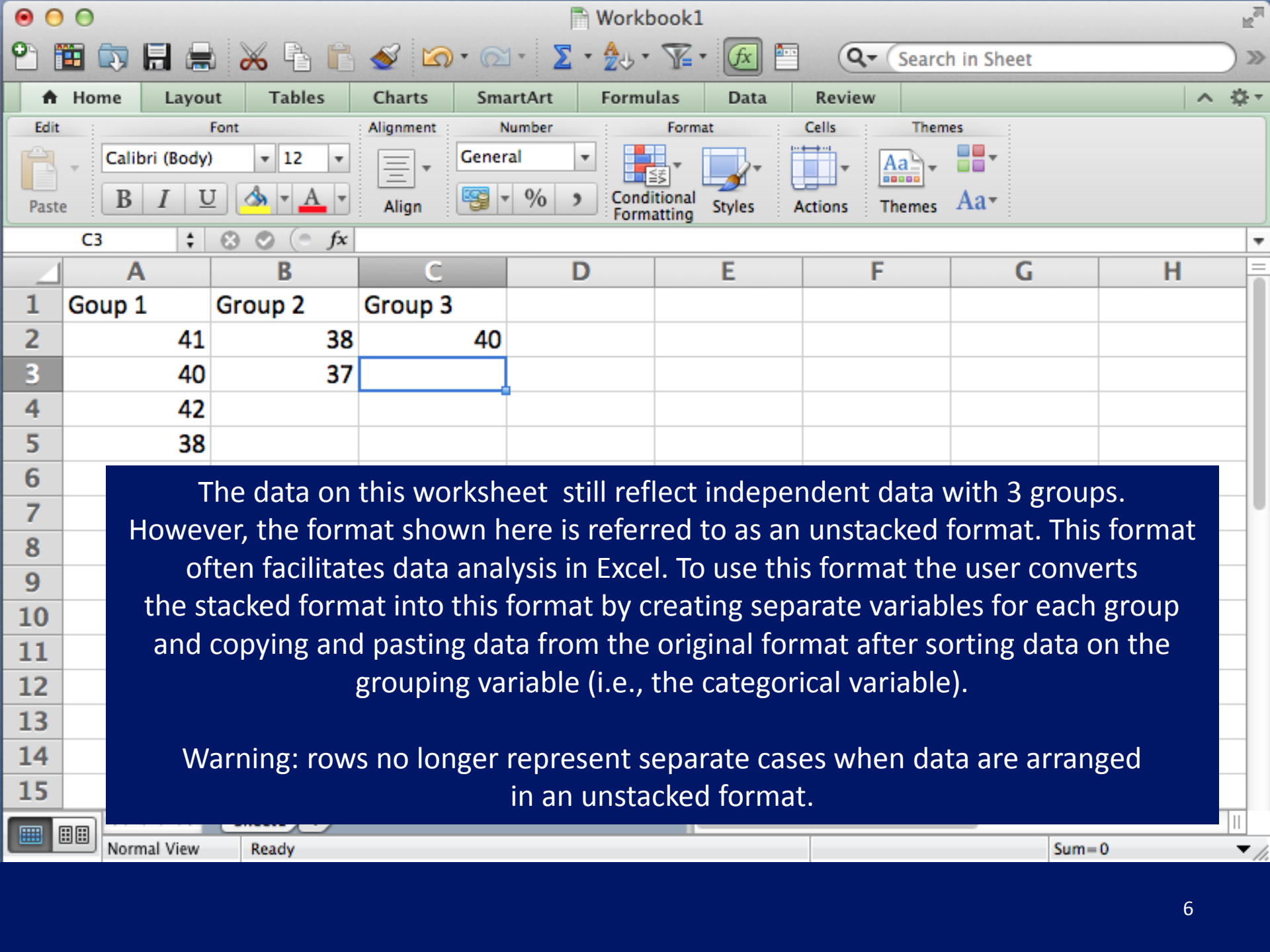
	A	B	C	D	E	F	G	H
1	Group	Score						
2	1	41						
3	1	40						
4	2	38						
5	1	42						
6	3	40						
7	2	37						
8	1	38						
9								
10								
11								
12								
13								
14								
15								

Data is entered one cell at a time. The above data reflect independent data with 3 groups. Data are independent when the data for different subjects (cases) do not depend on each other. Case 2 is in group #1 and has a score of 41. Case 3 is also in group #1 and has a score of 40, etc. The format shown here is referred to as a stacked format.

Sheet1

Normal View Ready

Sum = 38



The data on this worksheet still reflect independent data with 3 groups. However, the format shown here is referred to as an unstacked format. This format often facilitates data analysis in Excel. To use this format the user converts the stacked format into this format by creating separate variables for each group and copying and pasting data from the original format after sorting data on the grouping variable (i.e., the categorical variable).

Warning: rows no longer represent separate cases when data are arranged in an unstacked format.

Workbook1

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C3

	A	B	C	D	E	F	G	H
1	Goup 1	Group 2	Group 3					
2	41	38	40					
3	40	37						
4	42							
5	38							
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

The unstacked format is a graphical representation of a frequency table. The frequency of a category (or class interval when the values are spread out) is the number of data values that fall in that category or range specified by that class interval.

Frequency Table	
Category	Frequency
Group 1	4
Group 2	2
Group 3	1

Sheet1

Normal View Ready Sum=0

Workbook1

Search in Sheet

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A1 Pretest

	A	B	C	D	E	F	G	H
1	Pretest	Posttest						
2	39	42						
3	37	38						
4	40	40						
5	39	41						
6	35	39						
7	40	41						
8	41	41						
9								
10								
11								
12								
13								
14								
15								

Sheet1

Normal View Ready Sum = 0

The data on this worksheet reflect dependent data.

Data are dependent when they consist of multiple measurements for the same subject (case). For example, case 1 receives a score of 39 on a pretest measurement and a score of 42 on a posttest measurement.

Warning: don't confuse dependent data with unstacked independent data. Using dependent data, each row represents a different case whereas rows do not represent individual cases in an unstacked Independent data format.

Workbook1

Search in Sheet

Home Layout Tables Charts SmartArt Formulas Data Review

Edit Font Alignment Number Format Cells Themes

Paste Calibri (Body) 12 B I U General Conditional Formatting Styles Actions Themes

C1 Difference

	A	B	C	D	E	F	G	H
1	Pretest	Posttest	Difference					
2	39	42						
3	37	38						
4	40	40						
5	39	41						
6	35	39						
7	40	41						
8	41	41						
9								
10								
11								
12								
13								
14								
15								

Sheet1

Normal View Enter Sum = 0

Select cell C1 and enter the text Difference.
Notice the text is displayed in both cell C1 and the formula bar when cell C1 is active.

Workbook1

Search in Sheet

Home Layout Tables Charts SmartArt Formulas Data Review

Edit Font Alignment Number Format Cells Themes

Paste Calibri (Body) 12 Bold Italic Underline Color Fill Background Color Conditional Formatting Styles Actions Themes

C2 fx =A2-B2

	A	B	C	D	E	F	G	H
1	Pretest	Posttest	Difference					
2	39	42	-3					
3	37	38						
4	40	40						
5	39	41						
6	35	39						
7	40	41						
8	41	41						
9								
10								
11								
12								
13								
14								
15								

Select cell C2 and enter the formula =A2-B2.
Notice the following:

- Formulas start with an equal sign
- Formulas don't contain spaces
- The formula =A2-B2 subtracts the value contained in cell B2 from the value contained in cell A2
- When cell C2 is active, the formula is displayed in the formula bar
- The result of the operation is displayed
 - in cell C2

Sheet1

Normal View Ready

Sum = -3

Workbook1

Search in Sheet

Home Layout Tables Charts SmartArt Formulas Data Review

Edit Font Alignment Number Format Cells Themes

Paste Calibri (Body) 12 Bold Italic Underline Color Fill Background Color Conditional Formatting Styles Actions Themes

C2 fx =A2-B2

	A	B	C	D	E	F	G	H
1	Pretest	Posttest	Difference					
2	39	42	-3					
3	37	38						
4	40	40						
5	39	41						
6	35	39						
7	40	41						
8	41	41						
9								
10								
11								
12								
13								
14								
15								

Sheet1

Normal View Ready

Sum = -3

Select cell C2 and enter the formula =A2-B2.

Notice the following:

- Formulas start with an equal sign
- Formulas don't contain spaces
- The formula =A2-B2 subtracts the value contained in cell B2 from the value contained in cell A2
- When cell C2 is active, the formula is displayed in the formula bar
- The result of the operation is displayed in cell C2

Workbook1

Search in Sheet

Home Layout Tables Charts SmartArt Formulas Data Review

Edit Font Alignment Number Format Cells Themes

Paste Calibri (Body) 12 B I U General Conditional Formatting Styles Actions Themes

C8 fx =A8-B8

	A	B	C	D	E	F	G	H
1	Pretest	Posttest	Difference					
2	39	42	-3					
3	37	38	-1					
4	40	40	0					
5	39	41	-2					
6	35	39	-4					
7	40	41	-1					
8	41	41	0					
9								
10								
11								
12								
13								
14								
15								

Sheet1

Normal View Ready Sum=0

Excel replicates the formula from C2 down to cell C8 using relative addressing. The original formula =A2-B2 in cell C2 is changed to =A3-B3 in cell C3, and so on until cell C8 where the formula is =A8-B8.

If absolute addressing were used (i.e., =\$A\$8-\$B\$8), all the formulas in cells C2:C8 would be the same: =\$A\$8-\$B\$8 after the Fill Down operation.

Excel Syntax

The following are the most common arithmetic operators used in Excel formulas

+

for addition,
e.g.,
=A1+A2

—

for subtraction,
e.g.,
=A1-A2

*

for multiplication,
e.g.,
=A1*A2

/

for division,
e.g.,
=A1/A2

Parentheses can be included to specify order of operations.

For example, $= (A1 + A2) / A3$ will add the values of cells A1 and A2 and divide the sum by the value of cell A3.

Workbook1.xlsx

Search in Sheet

Home Layout Tables Charts SmartArt **Formulas** Data Review

Function: Insert, AutoSum, Formula Builder, **Reference**, Show, A1 to R1C1, Switch Reference, Insert Name

Audit Formulas: Trace Precedents, Trace Dependents, Remove Arrows, Check for Errors

Calculation: Recalculate All, Recalculate Sheet, Settings

C8 fx =A8-B8

	A	B	C	D	E	F	G	H
1	Pretest	Posttest	Difference					
2	39	42	-3					
3	37	38	-1					
4	40	40	0					
5	39	41	-2					
6	35	39	-4					
7	40	41	-1					
8	41	41	0					
9								
10								
11								
12								
13								
14								
15								

Sheet1

Normal View Ready Sum = 0

One can also use functions in Excel formulas. View a list and description of all Excel functions by selecting the Excel Formulas tab and clicking the Reference icon.

Workbook1.xlsx

Search in Sheet

Home Layout Tables Charts SmartArt Formulas Data Review

Function: Insert, AutoSum, Formula Builder, Reference, Show, A1 to A1, SAS1, Switch Reference, Insert Name

Audit Formulas: Trace Precedents, Trace Dependents, Remove Arrows, Check for Errors

Calculation: Recalculate All, Recalculate Sheet, Settings

B9: =AVERAGE(B2:B8)

	A	B	C	D	E	F	G	H
1	Pretest	Posttest	Difference					
2		39	42					
3		37	38					
4		40	40					
5		39	41					
6		35	39					
7		40	41					
8		41	41					
9		40.2857143						
10								
11								
12								
13								
14								
15								

Sheet1

Normal View Ready

Sum = 40.28571429

A useful function is the AVERAGE function defined as follows:

AVERAGE(number1,number2,...). Returns the arithmetic mean, where numbers represent the range of numbers.

For example, the formula =AVERAGE(B2:B41) in the displayed worksheet returns the arithmetic average or mean for the posttest variable.



Getting
Started

End of
Presentation

Ethics

Ethics is the study of right and wrong.

Data ethics represent the application of social and individual moral values and professional standards to collecting human subjects data, analyzing such data, and reporting findings.

Adhering to ethical standards helps keep one not only moral but also within the law. Although the application of data ethics vary somewhat by profession, e.g., business, health services, and education, there are elements of commonality across all professions.

Data Analyst's Responsibilities

1. Identifies and discloses conflicts of interest.

2. Promotes quality by maintaining competency in statistical methods and uses only appropriate statistical procedures.

3. Respects differences of opinion.

4. Obtains Institutional Review Board (IRB) review and approval of the research protocol before any data are collected.

5. Obtains informed consent from all research participants prior to data collection.

6. Maintains awareness of and follows applicable statutes and regulations.

7. Acknowledges the contributions and intellectual property of others.

8. Ensures data collection, analysis, and reporting reflect the unbiased search for truth.

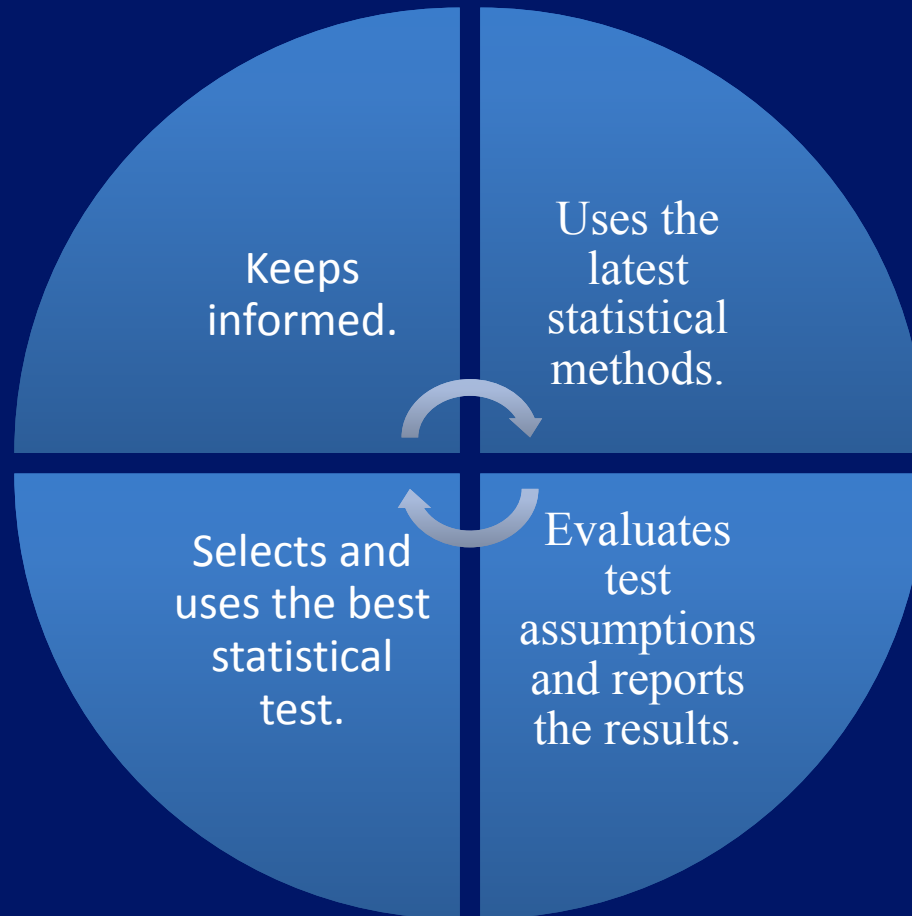
Potential Problems

1. Responsibilities to one's employer and the public interest can conflict.
2. Insufficient statistical knowledge and skills of the researcher, e.g., the researcher is a content expert and not a research/statistics expert.
3. Ignoring unfavorable data or results.
4. Using biased samples, i.e., samples that are not representative of the target population. This includes using very small samples sizes and/or using a biased sampling procedure.
5. Confusing statistical significance with practical significance (i.e., effect size).
6. Using biased questions on a survey.
7. Failing to be intellectually honest, such as conducting research to prove a point and not being open to other conclusions.
8. Overgeneralizing results beyond the target population.
9. Ignoring statistical error.

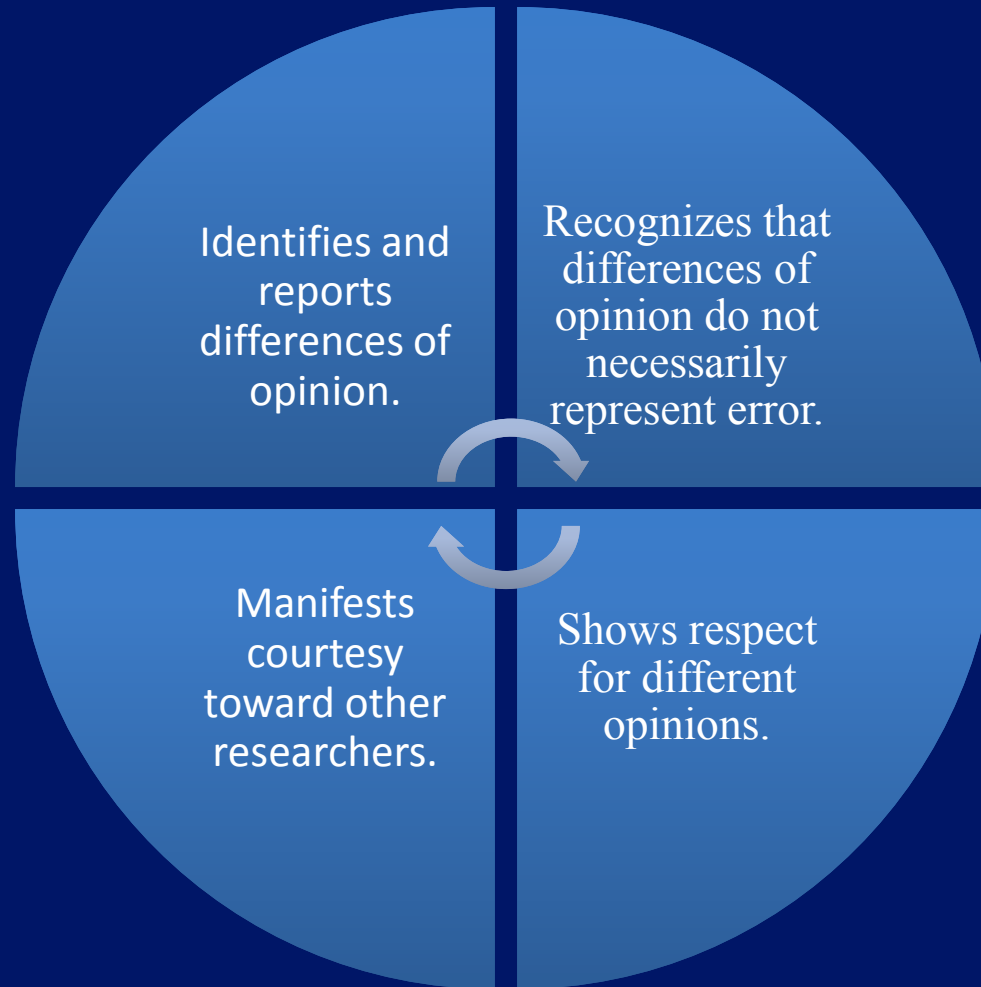
1. Identifies and discloses conflicts of interest.



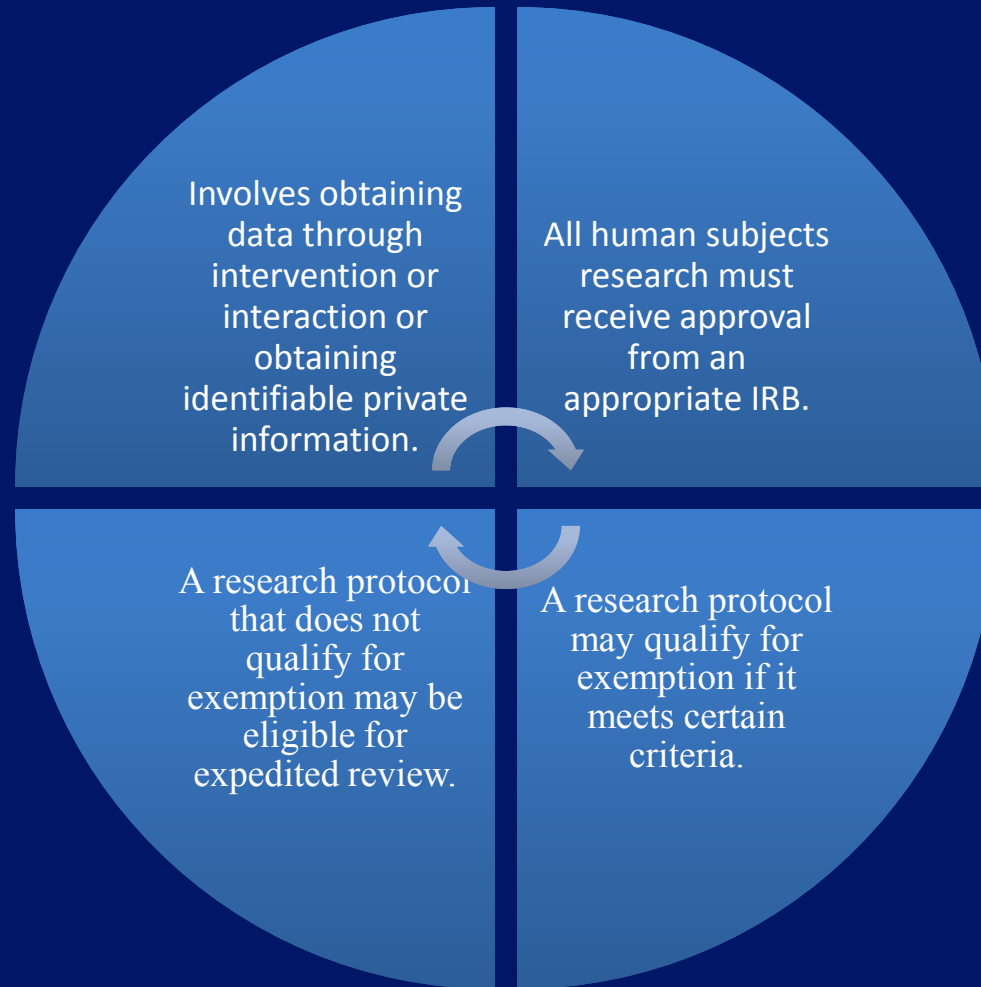
2. Promotes quality by maintaining competency in statistical methods and uses only appropriate statistical procedures.



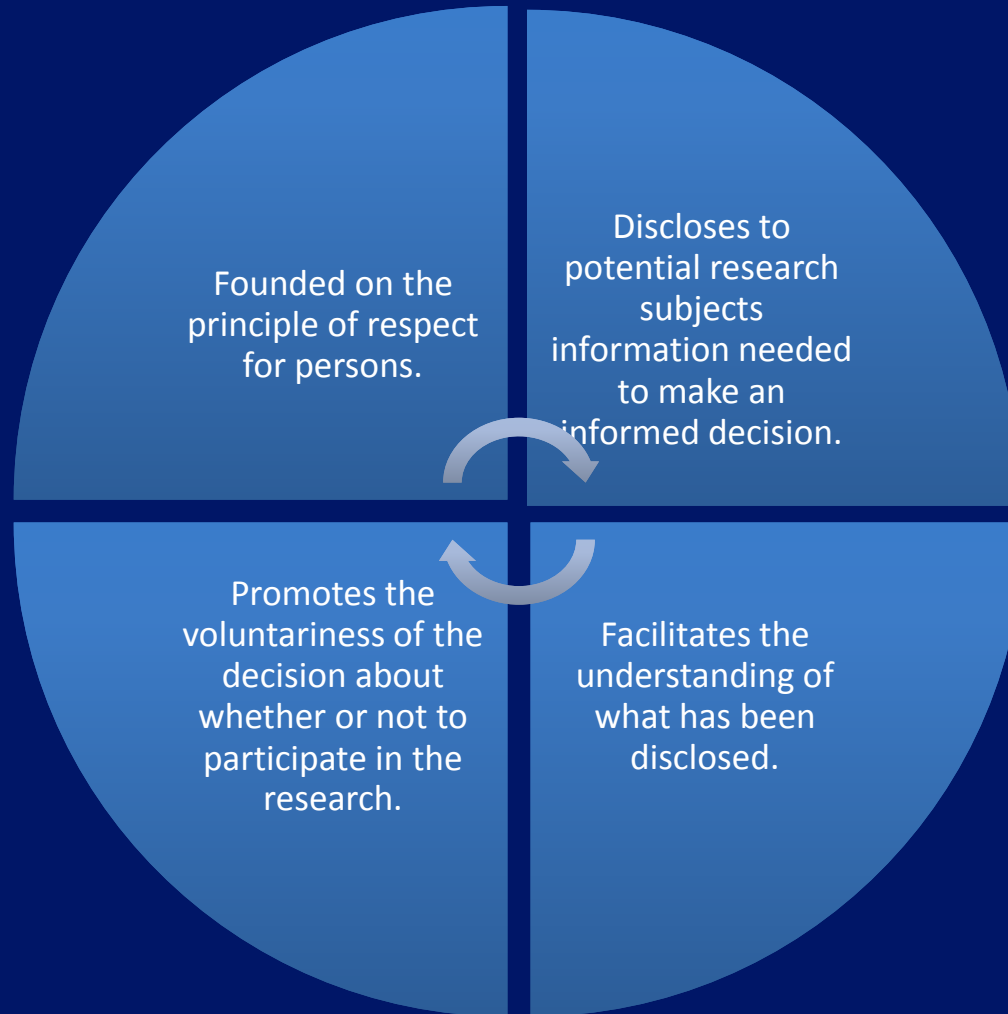
3. Respects differences of opinion.



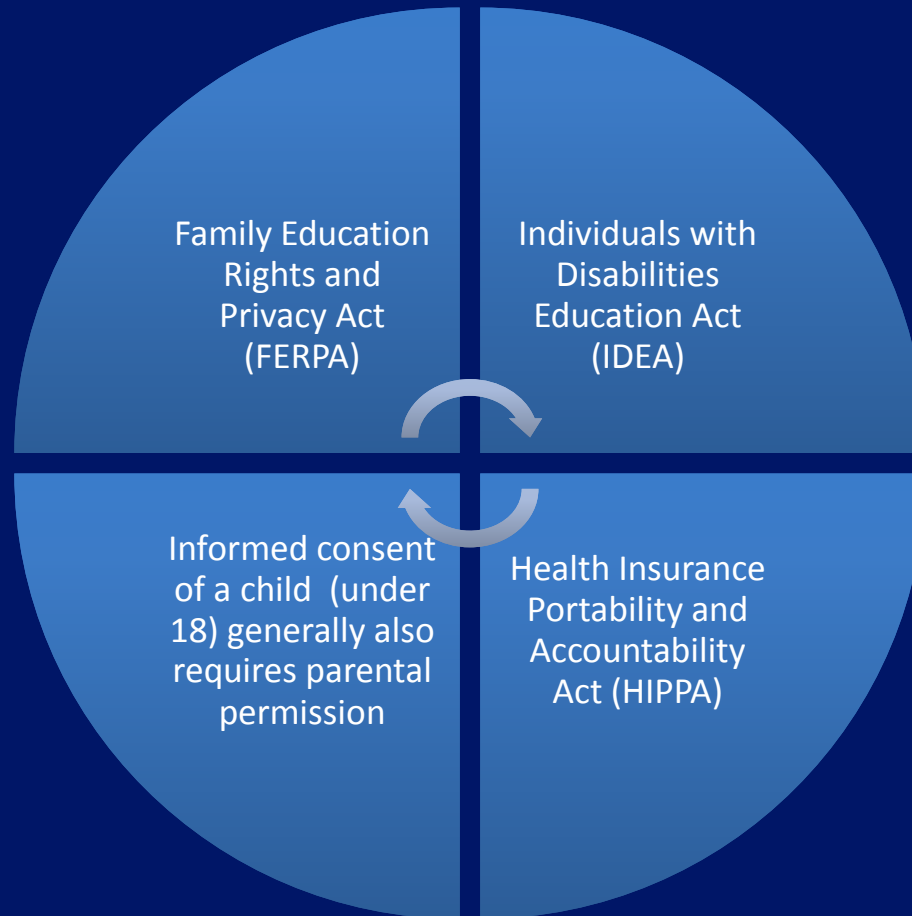
4. Obtains Institutional Review Board (IRB) review and approval of the research protocol before any data are collected.



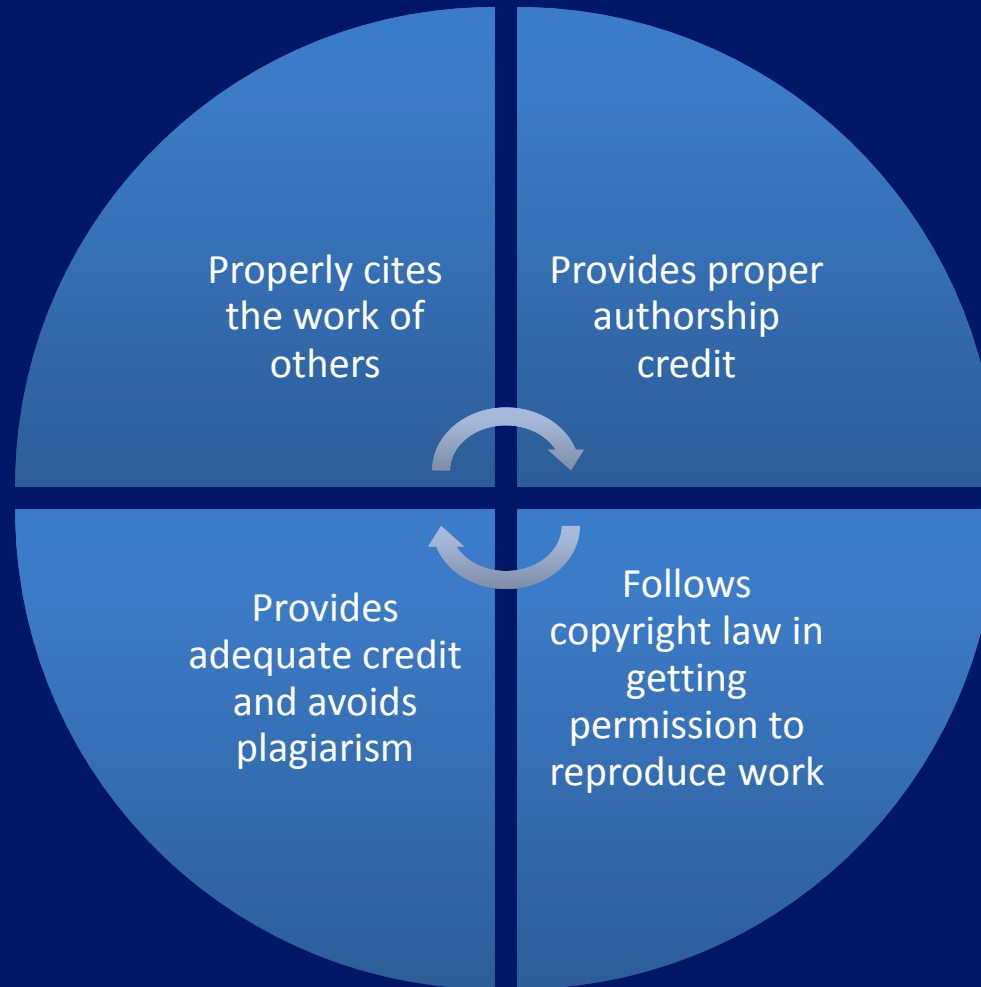
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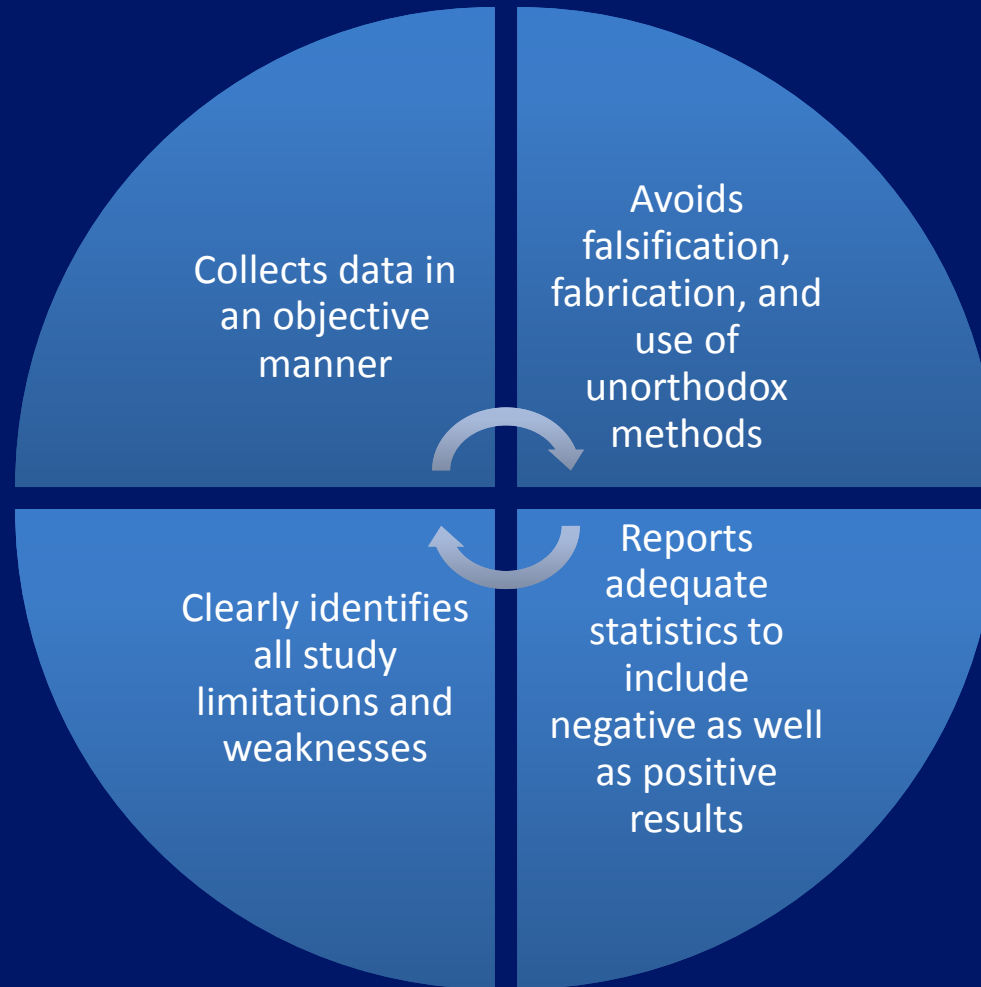
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7. Acknowledges the contributions and intellectual property of others.



8. Ensures data collection, analysis, and reporting reflect the unbiased search for truth.





Approaches to Ethical Problems

1. Be proactive in preventing the occurrence of ethical problems
2. Cope with ethical problems as they arise

Preventing Problems

Study previous ethical problems.

Participate in education and training programs that address ethical issues in one's discipline and profession

Maintain situational awareness during the course of planning, data collecting, analysis, and reporting

Avoid pressuring research participants

Respect confidentiality and privacy

Follow the Hippocratic dictum: First do no harm

Be transparent, i.e., free from deceit

Tap into ethics codes governing one's profession, e.g., American Educational Research Association, American Psychological Association, American Statistical Association, etc.

Dealing with Problems

Speak up about ethical problems

Identify issues and parties involved

Consult with colleagues, peers, and stakeholders

Identify options, analyze options in terms of moral principles, consider consequences, arrive at a decision, and act with commitment

Maintain situational awareness during the course of planning, data collecting, analysis, and reporting

Analytics cannot
compensate for the
negative impacts of:



```
graph TD; A[Analytics cannot compensate for the negative impacts of:] --- B[persisting in a faulty line of research]; A --- C[using a faulty research design]
```

persisting in a faulty
line of research

using a faulty
research design



Data Ethics

End of
Presentation