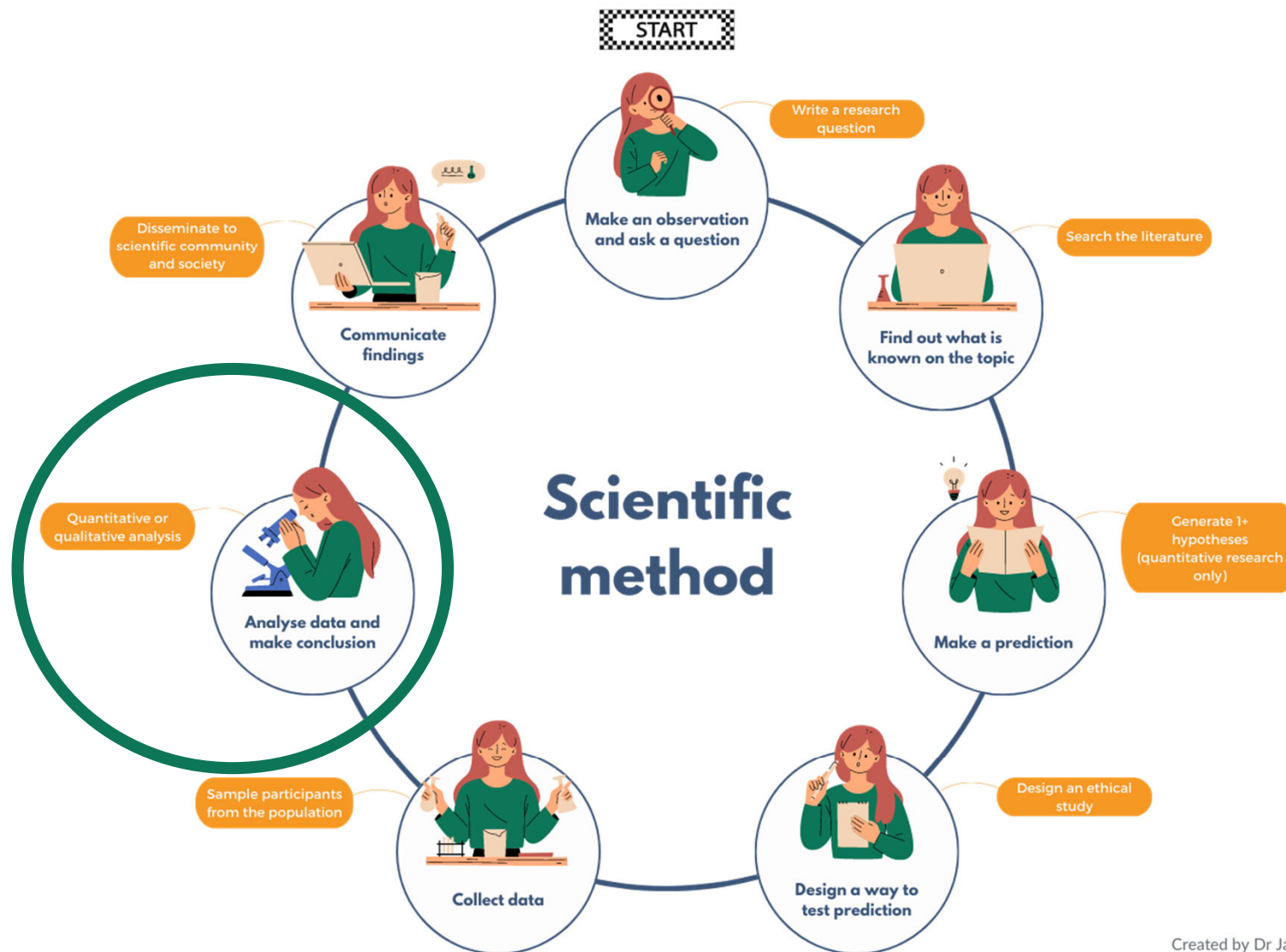


# Lab report video 4

Results section



# Purpose of the Results section

The purpose of the Results section is to:

Preliminary statistics

1. Describe the data in terms of:

a) The sample – i.e., how did your sample respond to your scales, on average?

2. Test your hypotheses:

a) What analyses did you run to test your hypotheses?

b) What were the results of those analyses?

Main analyses

- Hypothesis testing
- Significance testing
- Note: We state what the results were, but we do not interpret them in terms of the literature (this belongs in the Discussion).

# Structure of the Results section

Differs greatly depending on the analysis conducted.

For our purposes:

1. Preliminary statistics
2. Main analyses

# Preliminary statistics

- Used to describe the data and the sample in a basic way, i.e., these statistics are useful for the reader to know, but are not our main analyses
- Provide context, much like stating the average age of the sample, the most commonly reported ethnic identity, etc. in the Participants

## 1a. Describing the data from the sample

- To give us and our readers a general sense of the sample characteristics, we can provide some basic descriptive statistics
- Our sample is relatively large and we need a way of aggregating their responses to get a general feel for what they reported
- One aggregate statistic is the mean score (average), i.e., the mean of all participant responses, one for each of our main variables
- This gives us a sense of how participants responded to each scale, on average

# 1a. Describing the data from the sample continued

- The mean score by itself is not informative though
- If you simply provide a mean scale score, it is unclear how representative that mean is for every single participant in your sample
  - We therefore need to also provide the standard deviation, i.e., how much participant scores deviated from that group mean, on average (to be reported in your Results section, but not described)

## Describing the mean scale scores

- We also need to know the scale end points, i.e., the minimum and maximum scores possible on each scale (already reported in your Method section)
- You can then comment on whether the mean score was above, below, or close to the mid-point of the response scale

# Summary so far

- We've covered the first of the two purposes of the Results section:
  1. To describe the data, which we do by:
    - a) Describing how the sample responded to each scale, by reporting and describing scale means (need to also report, but **not** describe, standard deviations)
- Now going to cover the second purpose of the Results section:
  2. To test our hypotheses



# Main analyses

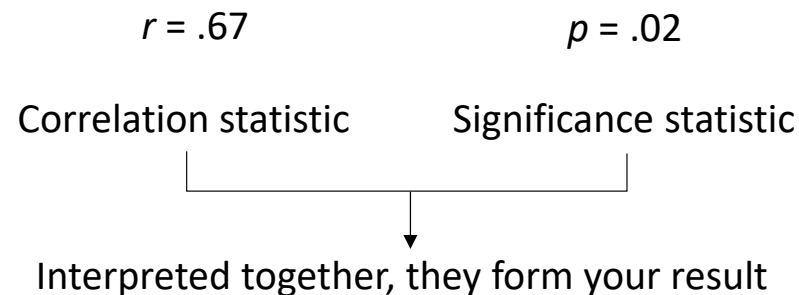
- Used to test our hypotheses to see if the data aligns with what we expected to find or not
- Therefore, need to be appropriate for addressing the hypotheses and the broader research question you have

## 2a. Stating analyses used to test hypotheses

- We want to clearly state the type of statistical analysis that was conducted in order to test our hypotheses
- E.g., “To test the hypotheses, a series of *t*-tests were conducted.”
  - Note: This example is not using the type of analysis your report uses

## 2b. Stating the results of the analyses

- When we conduct a Pearson's correlation, the statistics program will not only give us the Pearson's correlation statistic ( $r$  value), but also a significance statistic ( $p$ -value)
- The  $p$ -value provides an indication of the significance of the  $r$  value
- We want to interpret the  $p$ -value first, then the Pearson's correlation statistic



# Please note

The concept we're about to explore is very unintuitive, so if you are finding that it isn't quite making sense, **please do not worry and do not feel bad.**

I will go into as much detail as is appropriate for first-year and then state the bare bones of what you need to know for your lab report towards the end.

# Alternative vs null hypotheses

## **Alternative hypothesis**

- The prediction we make at the beginning of our study about what we think is going to happen with the results
- Says that something is genuinely happening out there in the world and we will see it reflected in our data in the form of a statistically significant relationship between the variables in our study

## **Null hypothesis**

- Opposes the alternative hypothesis
- Says there is really is no relationship between the variables we're interested in

*Are our data consistent with the alternative hypothesis or the null hypothesis?*

# $p$ -values

- The  $p$ -value helps us to determine whether our data are consistent or inconsistent with the null hypothesis
- The  $p$ -value is testing the null hypothesis
- The  $p$ -value is a number that ranges from 0 to 1. “P” stands for “probability”.
- Tells us how probable the data that we have would be if there was actually no relationship in the population
  - We could have sampled a group of participants from the population that make it look like there’s a relationship when there isn’t one

# Sampling reminder

Population

vs

Sample



# Infinite tests, random chance, and probability

- Let's assume that there isn't a relationship between the variables in the population
- Let's say we ran an infinite number of these same statistical tests, using different people in each of the samples
- How likely is it that the tests would generate these same results that we've found in our study, just simply due to random chance?
- In other words, how likely is it that we've found these results in the scenario when there is no relationship between the variables of interest?



# Infinite tests, random chance, and probability continued

- We can never say the results we have found are definitively not due to random chance alone
- We can only say that there is a low probability that they are due to random chance alone
- How do we determine what this “low” probability is?
  - We need a cut-off point that indicates what an “acceptable” probability is

# $p$ -value cut-off and interpretation

- The cut-off point for a  $p$ -value is commonly set to 0.05\*
- What this cut-off point of 0.05 means is that if our statistical analyses give us a  $p$ -value that is less than .05, i.e., anywhere from 0 to .049, **we can be reasonably sure that our results** (the relationship between variables) **might actually just be due to random chance 5% of the time**
- 5% of all of those infinite tests seems pretty small, so that's deemed to be an acceptable level of uncertainty

\*How the cut-off point of .05 was decided is a whole other story. You may see more stringent cut-offs in different articles, e.g., .01 or even .001, but we are using the most common cut-off of .05 in your assignments.

# $p$ -value cut-off and interpretation continued

## $p < .05$

- If you get a  $p$ -value *less than* .05, the corresponding correlation is considered **statistically significant**
  - The data we have would be sampled from the population where there is no relationship less than 5% of the time
  - Therefore, the data aren't consistent with the null hypothesis

## $p \geq .05$

- If you get a  $p$ -value *equal to or more than* .05, the corresponding correlation is considered **statistically non-significant**
  - The data we have would be sampled from the population where there is no relationship more than 5% of the time
  - Therefore, the data are consistent with the null hypothesis

Note: < means less than; > means more than

# How do I apply this to my findings?

1. Check the significance testing via  $p$ -value

If not significant, do **not** interpret  $r$  value.

If significant, proceed to interpret  $r$  value via step 2:

2. Check the strength and direction of hypothesis testing result via  $r$  value

- a) Look at the  $r$  value and assess its strength:

Pearson's $r$	Correlation strength interpretation
Between +/- 0.60 and +/- 1	Strong
Between +/- 0.30 and +/- 0.59	Moderate
Below 0.30	Weak

- b) Look at the  $r$  value and assess its direction:

- If the value is positive, the relationship is positive
- If the value is negative, the relationship is negative

Note: < means less than; > means more than

# How do I apply this interpretation to my hypotheses?

- Did you predict that there would be a relationship between the variables?
  - Then  $p$  needs to be  $< .05$  or your hypothesis is not supported
- Did you predict that the relationship would be positive?
  - Then  $p$  needs to be  $< .05$  and  $r$  needs to be positive, or your hypothesis is not supported
- Did you predict that the relationship would be negative?
  - Then  $p$  needs to be  $< .05$  and  $r$  needs to be negative, or your hypothesis is not supported
- What if  $r$  is weak?
  - That is okay; your hypothesis does not make a prediction about strength, but you will need to consider this weak correlation in your Discussion

# Skills involved in completing the Results section

- Critical thinking
- Interpretation/evaluation
- Communicating clearly and professionally

# Questions

Please post any questions you might have on the discussion boards.