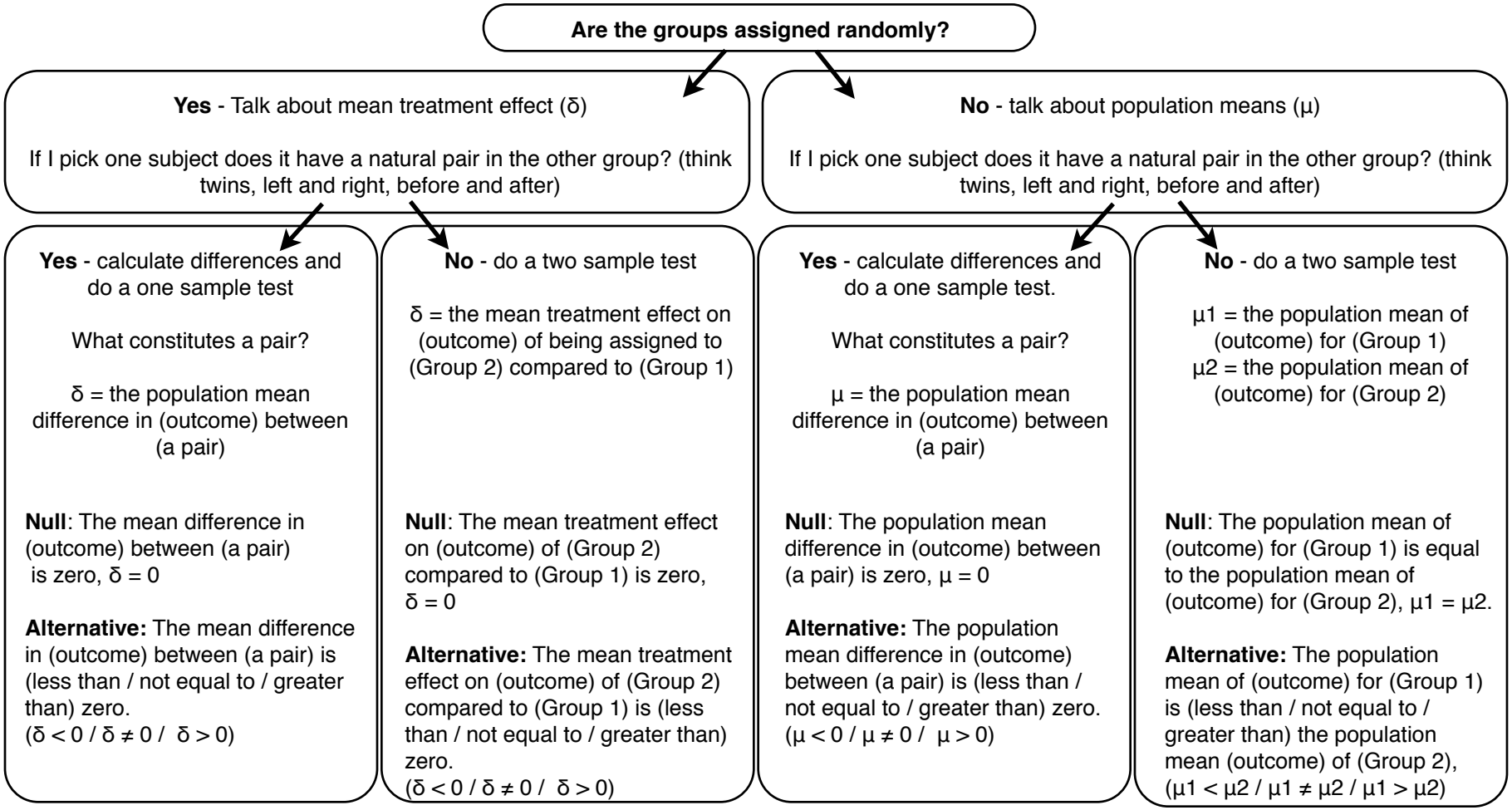
Hypotheses for two group comparisons

Identify the outcome, and the groups (or treatments), and whether the groups/treatments were randomly assigned.

The outcome variable is:
Group 1: Group: 2
Substitute in the identified outcome and groups where indicated with (outcome) and (Group 1), (Group 2).



Do the test! (randomization/permutation or t-test or ...)

Summary of Statistical Findings

A: There is (insert statement) evidence that the mean difference in (outcome) between (a pair) is (less than / not equal to / greater than) zero (test name, one-sided/two-sided p-value = ?). The mean (outcome) for (pair member 1) is estimated to be ?? (units) (more / less) than (pair member 2)(95% confidence interval ?? to ??).

B: There is (insert statement) evidence that the treatment effect of (Group 2) compared to (Group 1) on (outcome) is (less than / not equal to / greater than) zero (test name, one-sided/two-sided p-value = ?). (Group 2) is estimated to (reduce/increase) (outcome) ?? (units) (more / less) than (Group 1) (95% confidence interval ?? to ??).

C: There is (insert statement) evidence that the population mean difference in (outcome) between (a pair) is (less than / not equal to / greater than) zero (test name, one-sided/two-sided p-value = ?). The mean (outcome) for (pair member 1) is estimated to be ?? (units) (more / less) than (pair member 2) (95% confidence interval ?? to ??).

D: There is (insert statement) evidence that the population mean (outcome) of (Group 1) is (less than / non-equal to / greater than) the population mean (outcome) of (Group 2) (test name, one-sided/two-sided p-value = ?). The population mean (outcome) of (Group 1) is estimated to be ?? (units) (higher / lower) than the population mean (outcome) of (Group 2) (95% confidence interval ?? to ??).

Were the subjects selected at random from a larger population? (add the statement to your summary)

Yes Since the subjects were selected at random from (Population A) and (Population B), the statistical inferences can be extended to these populations.

No Since the subjects were not selected at random from a larger population, the statistical inferences are limited to the subjects selected in this study.

Notes:

All the summary statements have been written with respect to the alternative, but it is equally correct to write them in terms of the null. You would replace “evidence” with “evidence against” and “not equal to” with “equal to”.

It is **INCORRECT** to say “**the null/alternative is true/false/correct/incorrect**”. We never really know, we just collect evidence.

The distinction between writing about treatment effects and population means isn’t quite as concrete as I’ve presented it, because it isn’t incorrect to compare the population means of subjects in one group versus the other in a controlled experiment. Hence, the hypotheses can be stated like those for population means. The primary difference occurs in the summary. For a controlled experiment you can say “**Group 1 increases/decreases** the outcome compared to Group 2”. For population means the most you can say is “being in **Group 1 is associated with an increase/decrease** in outcome compared to Group 2”.