# Study Session – Inference with means

- Sign in
- Grab a calculator
- Use a sheet of paper (in your notebook) to practice along with us
- Make sure I give you formula sheets as well

Baby walkers are seats hanging from frames that allow babies to sit upright with their legs dangling and feet touching the floor. Walkers have wheels on their legs that allow the infant to propel the walker around the house long before he or she can walk or even crawl. Typically, babies use walkers between the ages of 4 months and 11 months.

Because more walkers have tray table in front that block babies' view of their feet, child psychologists have begun to questions whether walkers affect infants' cognitive development. One study compared mental skills of a random a=sample fo those who used walkers with a random sample of those who never used walkers. Mental skill scores averaged 113 for 54 babies who used walkers (standard deviation of 12) and 123 for 55 babies who did not use walkers (standard deviation of 15).

**Check conditions and state the correct inference procedure.**

walkers

random - stated

54 < 10% of all babies

54 > 30 - assume nearly normal

not

random - stated

55 < 10% of all babies

55 > 30 - assume nearly normal

Assume independent groups

2 sample t-test

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**Write the hypothesis for the inference procedure.**

population

$H_0: \mu_w = \mu_{no}$

$H_A: \mu_w \neq \mu_{no}$

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**Complete the mechanics for the inference procedure.**

$t_{102.8} = -3.84$ p-value = 0.0002

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**Write your conclusion to answer the question: is there evidence that the mean mental skill score of babies who use walkers is different from the mean mental skill score of babies who do not use walkers?**

Due to a low p-value of 0.0002, which is lower than my $\alpha$ of 0.05, we reject the null. There is evidence that the mean mental skill score of babies...

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**Suppose that a study using this design found a statistically significant result. Would it be reasonable to conclude that using a walker causes a change in mean mental skill score? Explain your answer.**

20 students in a networking class at the local community college took a test before they completed the module and after. Below is the data both pre- and post- test. The professors wish to determine the average improvement in skills due to the module training. Create a 95% confidence interval to show average improvement.

| Student | Pre-module score | Post-module score | |
|---|---|---|---|
| 1 | 18 | 22 | 6 |
| 2 | 21 | 25 | 4 |
| 3 | 16 | 17 | 1 |
| 4 | 22 | 24 | 2 |
| 5 | 19 | 16 | -3 |
| 6 | 24 | 29 | |
| 7 | 17 | 20 | |
| 8 | 21 | 23 | |
| 9 | 23 | 19 | |
| 10 | 18 | 20 | |
| 11 | 14 | 15 | |
| 12 | 16 | 15 | |
| 13 | 16 | 18 | |
| 14 | 19 | 26 | |
| 15 | 18 | 18 | |
| 16 | 20 | 24 | |
| 17 | 12 | 18 | |
| 18 | 22 | 25 | |
| 19 | 15 | 19 | |
| 20 | 17 | 16 | |

**Check conditions and state the correct inference procedure.**

1 sample matched pair

t-interval

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**One-Sample Statistics**

| | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|
| Difference | 20 | 2.0500 | 2.83725 | .63443 |

$t_{19}$ df = 19

(0.7221, 3.3779)

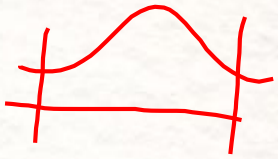
$2.0500 \pm t^*_{19}\, 0.63$

**One-Sample Test**

| | Test Value = 0 | | | | | |
|---|---|---|---|---|---|---|
| | t | df | Sig. (2-tailed) | Mean Difference | 95% Confidence Interval Lower | Upper |
| Difference | 3.231 | 19 | .004 | 2.0500 | .7221 | 3.3779 |

**Using the given computer output, complete the mechanics for the inference procedure.**

$t_{19} = 3.231$



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**State your conclusion.**

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**Does your confidence interval demonstrate that the modules had improvements? What if the goal was 5 points of improvement, does your confidence interval demonstrate that?**

# Review

- Errors
- Alpha, Beta, Power
- Choosing between t and z procedures

# Questions?