Your name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| Part A: Calculating Descriptive Statistics |

Now let’s work with a larger dataset to practice how to get our descriptive statistics. Please open the “**Normtemp.csv**” dataset (on Moodle).

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| **B1. Calculate this in Excel:** | | | | | | | | | | |
| 1. | Create a new dummy-coded variable called, “adult” | | | | | |  | | | |
| 2. | How many adults are there in the sample? | | | 65 | | How many children? | | | 65 | |
| 3. | How many adult athletes are there? | | | | | | |
| 24 |  | | | | | | |
| 4. | Fill in the following information: | | *Mheartrate* = | | 73.76 | | | *SDheartrate =* | | 7.06 |
|  |  | | *MtempAM* = | | 98.25 | | | *SDtempAM =* | | 0.733 |
|  |  | | *MtempPM* = | | 97.74 | | | *SDtempPM =* | | 0.73 |
| 5. | For only children: | *Mheartrate* = | 74.15 | | *SDheartrate =* | | | 8.105 | |  |
| 6. | For only adults: | *Mheartrate* = | 73.369 | | *SDheartrate =* | | | 5.875 | |  |
| **7. Repeat all those descriptives in JASP and check your work against your Excel numbers. Resolve any discrepancies you find.**  **B2. Now, in JASP, do the following and Copy/Paste below:** | | | | | | | | | | |
| 1. | Copy and paste a frequency table of AgeStatus from JASP.   | *Frequencies for AgeStatus* | | | | | | | | | | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | AgeStatus | | Frequency | | Percent | | Valid Percent | | Cumulative Percent | | | Adult |  | 65 |  | 50.000 |  | 50.000 |  | 50.000 |  | | Child |  | 65 |  | 50.000 |  | 50.000 |  | 100.000 |  | | Missing |  | 0 |  | 0.000 |  |  |  |  |  | | Total |  | 130 |  | 100.000 |  |  |  |  |  | |  | | | | | | | | | | | | | | | | | | | |
| 2. | Copy and paste a descriptive table with the overall means and standard deviations of heart rate, AM temp, and PM temp.   | *Descriptive Statistics* | | | | | | | | | --- | --- | --- | --- | --- | --- | --- | --- | |  | | Heart Rate | | Body Temp AM | | Body Temp PM | | | Mean |  | 73.762 |  | 98.249 |  | 97.742 |  | | Std. Deviation |  | 7.062 |  | 0.733 |  | 0.733 |  | |  | | | | | | | | | | | | | | | | | |
| 3. | Now create separate descriptive tables examining the means and standard deviations for those three variables separately by sex.   | *Descriptive Statistics* | | | | | | | | | | | | | | | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | | Heart Rate | | | | Body Temp AM | | | | Body Temp PM | | | | | |  | | Adult | | Child | | Adult | | Child | | Adult | | | Child | | | Mean |  | 73.369 |  | 74.154 |  | 98.105 |  | 98.394 |  | 97.595 |  | 97.888 | |  | | Std. Deviation |  | 5.875 |  | 8.105 |  | 0.699 |  | 0.743 |  | 0.701 |  | 0.740 | |  | |  | | | | | | | | | | | | | | | | | | | | | | | | |

4. Now, use the frequency table you made for question 1 above and copy that information into Excel to make a bar graph in Excel showing the frequency of adults and children in your sample. Format the graph into APA style and paste below.

# Part B. What test to run?

*Before we can analyze our data (and even before we run our study!), we need to think about how we will analyze our data. The structure of the data sometimes limits our choice of analysis (for example, how we cannot compute a mean if our variable is structured as nominal). Sometimes data can technically* *be analyzed using different statistical tests, BUT only one analysis will provide the comparison we actually want to make (in other words, only one analysis type will truly test our hypothesis).* When deciding between t-tests, we have to consider and answer the following questions:

|  |  |  |
| --- | --- | --- |
| 1 | Do we have one or two groups (and not more)? | T-tests are only appropriate when we have 2 groups or less |
| 2 | Do we have one group of *sample* data? | If we have one group of sample data, we will be using a z-test OR one-sample t-test |
| 2b | Do we know the population parameters *μ* and *σ* ? Or are we comparing to a specific value/criterion? | We use the Z-test when we know the population parameters OR are comparing to a single value. Otherwise, when these values are unknown we use the one-sample t-test. |
| 3. | Do we have TWO groups of sample data? | If we have exactly two groups of sampled data, then we will run either a paired-samples or independent samples t-test. |
| 4. | Are the two groups of sample data *dependent* or *independent* of each other? [Dependent data occurs when the same participants, or matched participants, provide data for BOTH variables. In other words, it is the same people, or matched people, giving you the data for each of your sample groups.] | If the data are *dependent*, we run a paired-samples t-test.  If the data are *independent,* we run an independent samples t-test. |
| 4a. | Does your hypothesis have a direction? [For example, you want to know if one group, specifically, is bigger, better, faster, stronger, etc, than the other group/population and you are not asking if it could also be the other way around] | If your hypothesis has no direction [e.g., “these two groups are different” without specifying the direction of that difference], then you need a two-tailed test. |
| 4b. | If your hypothesis has a direction, do you want to run a more liberal test (and get more false positives) or run a more conservative test (and get more false negatives)? {*Note: We usually run more conservative tests unless we are in desperate need of increasing our statistical power}* | For a more liberal test, you will check ONLY the tail that matches your predicted direction, known as a one-tailed test.  For a more conservative test, you will check both tails, in case either group is bigger/smaller than the other, known as a two-tailed test.Again, this is what we typically use even when we have a predicted direction. |

**A1. Paula Abdul wants to know whether the concert sales in the year after her first album were different from her concert sales in the year after her second album.**

What type of hypothesis is it?

| **Circle one below:** | **Write out the alternative hypothesis:** |
| --- | --- |
| Directional/Non-Directional | There will be a difference |
|  |  |

What analysis would you run?

| **Circle one below:** | **Circle one below:** |
| --- | --- |
| One-tailed/Two-tailed | One-sample T-test  / Paired-Samples T-test / Independent Samples T-test |

| What is the test examining in mathematical form?  Check one below |
| --- |
| ☐ > ☐ < ☐ ≠ |

**A2. Facebook is examining a new interface layout for their newsfeed. They select a group of 10,000 users and change the newsfeed appearance to the new style for half of them. After two weeks, they analyze how much time users with the original versus new style spent on Facebook.**

| **Circle one below:** | **Write out the alternative hypothesis:** |
| --- | --- |
| Directional/Non-Directional | There will be a difference in the amount of time spent |
|  |  |

What analysis would you run?

| **Circle one below:** | **Circle one below:** | |
| --- | --- | --- |
| One-tailed/Two-tailed | One-sample T-test  / Paired-Samples T-test / Independent Samples T-test | |
| What is the test examining in mathematical form?  Check one below | |
| ☐ > ☐ < ☐ ≠ | |

# Part C. Conducting Inferential Analyses

For this part, we are still using the Normtemp.csv data.

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| 1. | Imagine I want to know whether individuals’ morning temperatures differ significantly from their afternoon temperatures | | |
|  | a. State the Null and Alternative Hypotheses: | | |
|  | *H0*: | There is no significant difference between morning and afternoon temps | |
|  | *HA*: | There is a significant difference between morning and afternoon temps | |
|  | b. What variable/s are you including in your analysis? | | |
|  | Variable/s: | Body\_Temp\_am and Body\_temp\_pm | |
|  | c. Is the hypothesis:  ☐ non-directional ☐ directional | | |
|  | d. What test should you use? (be specific!) | | Paired-subject t-test |
|  | e. Which of the following did you select when running your analysis?  **☐** ≠ **☐** > **☐**  < | | |
|  | f. Please copy the information from your output:   | *Paired Samples T-Test* | | | | | | | | | | | | | | | | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Measure 1 | |  | | Measure 2 | | t | | df | | p | | Cohen's d | | SE Cohen's d | | | Body Temp AM |  | - |  | Body Temp PM |  | 136.407 |  | 129 |  | < .001 |  | 11.964 |  | 0.043 |  | |  | | | | | | | | | | | | | | | | | Note.  Student's t-test. | | | | | | | | | | | | | | | |  | *Descriptives* | | | | | | | | | | | | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | | N | | Mean | | SD | | SE | | Coefficient of variation | | | Body Temp AM |  | 130 |  | 98.249 |  | 0.733 |  | 0.064 |  | 0.007 |  | | Body Temp PM |  | 130 |  | 97.742 |  | 0.733 |  | 0.064 |  | 0.007 |  | |  | | | | | | | | | | | | | | |

|  |  |  |
| --- | --- | --- |
|  | g. Report your results below in APA style sentences. | |
|  | When comparing the mean morning and afternoon body temperatures, we get a t-statistic of 136.41(<.001) with 129 degrees of freedom. Our 11.96 Cohen’s d implies a large effect.  We ran a two tailed paired samples t test to determine whether body themps were significantly different in the am than the pm. Results indicated that on average individuals had higher temps in the morning (M= , SD= )than in the afternoon (M= , SD= ) with t(129)=136.41, p(<.001) d= 11.96 | |
|  | h. What is your decision regarding *H0*? | Reject the null hypothesis  Fail to reject the null hypothesis |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 2. | Imagine I want to know whether adults have a faster afternoon heart rate than children. | | | |
|  | a. State the Null and Alternative Hypotheses: | | | |
|  | *H0*: | there is no difference between afternoon heart rates of adults and children | | |
|  | *HA*: | Adults have a faster afternoon heart rate than children | | |
|  | b. What variable/s are you including in your analysis? | | | |
|  | Variable/s: | Age Status, heart rate | | |
|  | c. Is the hypothesis:  ☐ non-directional ☐ directional | | | |
|  | d. What test should you use? (be specific!) | | | Independent samples t test because. |
|  | e. Which of the following did you select when running your analysis?  **☐** ≠ **☐** > **☐**  < | | | |
|  | f. Please copy the information from your output:   | *Independent Samples T-Test* | | | | | | | | | | | | | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | | t | | df | | | p | | Cohen's d | | SE Cohen's d | | | Body Temp PM |  | -2.311 |  | 128 |  | | 0.022 |  | -0.405 |  | 0.179 |  | |  | | | | | | | | | | | | | | *Note.*  Student's t-test. | | | | | | | | | | | | | | *Group Descriptives* | | | | | | | | | | | | | | |  | | Group | | N | | Mean | | SD | | SE | | Coefficient of variation | | | Body Temp PM |  | Adult |  | 65 |  | 97.595 |  | 0.701 |  | 0.087 |  | 0.007 |  | |  |  | Child |  | 65 |  | 97.888 |  | 0.740 |  | 0.092 |  | 0.008 |  | |  | | | | | | | | | | | | | | | | | |
|  | g. Report your results below in APA style sentences. | | | |
|  |  | | | |
|  | h. What is your decision regarding *H0*? | | Reject the null hypothesis  Fail to reject the null hypothesis | |

# Part D. Reporting Results from a Research Study

We conducted a research study by having students complete our online study. We are going to look at the data that resulted from our study. We will work through one problem together here in lab from start to finish. You will then work through a different problem using this same dataset and use it to write up your first lab report.

The research question we are asking for lab today is:

Researchers know that how information is framed can affect people’s perceptions of it. For example, you can frame the same numerical information in a positive way (e.g., glass half full) or in a negative way (e.g., glass half empty). Does framing a class’s grades in a negative vs. positive way change students’ interest in signing up for a class? We randomly assigned half of the class to hear about a class’s grades by pointing out the proportion of bad grades or good grades.

1. Half the class received a negative framing about how many students did badly in a class, while half the received a positive framing about how many students did well in a class. All students then indicated whether they would plan to take the class.
2. Open our study files to see what participants experienced.

The first thing we need to do is report the methods of our study. The purpose of this section is to clearly describe all the important steps of the study. It starts with a section describing the who, what, when, where, and why of your *sample.*

In order to provide this information, we need to 1) know how the study was conducted to describe things like where/when/why participants participated, and 2) analyze our demographic data to report more information about *who* the participants were and *how many* there were.

1. Open our Ttest Lab datafile so you can look at your descriptive statistics in JASP.
2. Let’s write up the participants section of our study together:

**Method**

***Participants***

**\* This participants section would be the same for this particular dataset regardless of which variables we are analyzing.**

1. Now we need to move onto the next section, which is our *procedure.* This section needs to clearly describe how the study was run. If another researcher wanted to run this same study, they should have enough information to understand what to do and how to do it. So we are providing information about what the participants completed or experienced, as well as making clear the temporal order of that.
2. For our procedure section, we are only going to write in detail about the variables related to our current research question. \*For your lab report, you will be discussing a different research question and will therefore need to edit your Procedure section to reflect the variables you’ll be analyzing\*

The variables of interest in the dataset are called: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. So go back to the study file and try to understand what participants completed or experienced. It is also important to make clear the design of the study (within-subjects or between-subjects) by indicating whether *all* participants completed/saw things or whether *some* participants completed/saw certain things (and if so, which/how many: for example, half saw x).
2. Let’s try to write the procedure together:

***Procedure***

\*Note: Remember that elements of this procedure will need editing for your lab report. We only discussed one set of variables in detail because they were the relevant ones for our research question in lab. But you are interested in a different question for the report. \*

1. Now we will move onto our results section. We can think of it the same way as the problems we analyzed earlier.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Researchers know that how information is framed can affect people’s perceptions of it. For example, you can frame the same numerical information in a positive way (e.g., glass half full) or in a negative way (e.g., glass half empty). Does framing a class’s grades in a negative vs. positive way change students’ interest in signing up for a class? | | |
|  | a. State the Null and Alternative Hypotheses: | | |
|  | *H0*: |  | |
|  | *HA*: |  | |
|  | b. What variable/s are you including in your analysis? | | |
|  | Variable/s: |  | |
|  | c. Is the hypothesis:  ☐ non-directional ☐ directional | | |
|  | d. What test should you use? (be specific!) | |  |
|  | e. Which of the following did you select when running your analysis?  **☐** ≠ **☐** > **☐**  < | | |
|  | f. Please copy the information from your output: | | |

|  |  |  |
| --- | --- | --- |
|  | g. Report your results below in APA style sentences. | |
|  |  | |
|  | h. What is your decision regarding *H0*? | Reject the null hypothesis  Fail to reject the null hypothesis |

9. Now write your discussion. What do we conclude from our analysis. In other words, did we find support for the hypothesis? Make sure to mention the variables rather than just saying something generic like “We found support for the hypothesis.”

10. Now we can copy/paste everything we wrote together into one full report with the following sections. Also paste the research question and alternative hypothesis before the method section so readers know what you are trying to examine through this research:

Researchers know that how information is framed can affect people’s perceptions of it. For example, you can frame the same numerical information in a positive way (e.g., glass half full) or in a negative way (e.g., glass half empty). This study examined whether framing a class’s grades in a negative vs. positive way would change students’ interest in signing up for a class.

**Method**

***Participants***

***Procedure***

**Results**

**Discussion**