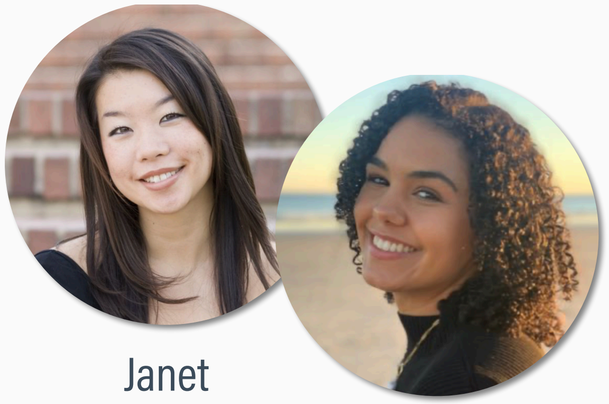
LAB WEEK 6

PAIRED-SAMPLES T-TEST

SKIN COLOR SATISFACTION AND BINGE EATING

Although it has been demonstrated that (a) body dissatisfaction and internalization of societal appearance standards contribute to disordered eating and (b) that internalization of societal appearance standards leads to decreased skin color satisfaction among Black women, it has not been established whether skin color dissatisfaction contributes to disordered eating among Black women or girls. The objective of the present study is to determine the influence of skin color satisfaction as a potential predictor for binge eating, and its effect through body image in Black girls during the vulnerable developmental period of adolescence.



Janet Tomiyama

Jordan Parker

Parker, J.E., Enders, C.K., Mujahid, M.S., Laraia, B.A., Epel, E.S., Tomiyama, A.J. (2022). Prospective relationships between skin color satisfaction, body satisfaction, and binge eating in Black girls. *Body Image*, *41*, 342-353.

KEY VARIABLES

Body Satisfaction

Body satisfaction is the facet of self-concept associated with weight, and includes the attitudes, evaluations, and feelings an individual holds about his or her own body.

Age

The grouping variable was age. Participants were followed longitudinally, with dependent variable measured at ages 10 and 18.

RESEARCH QUESTION

- Question: Do Black girls experience a change in body satisfaction during adolescence from age 10 to 18?
- The study used a within-subjects design where satisfaction was measured yearly in the same sample of girls
- The paired-samples test is appropriate for comparing two means from a within-subjects design

LOAD PACKAGES AND IMPORT DATA

= data frame name
= variable name
= raw data file name

```
# LOAD R PACKAGES ----

# load R packages
library(psych)
library(summarytools)

# READ DATA ----

# github url for raw data
filepath <-
  'https://raw.githubusercontent.com/craigenders/psych250a/main/data/BodySatWideData.csv'

# create data frame called BodySat from github data
BodySat <- read.csv(filepath, stringsAsFactors = T)
```

COMPUTE CHANGE SCORES

= data frame name

= variable name

```
# COMPUTE NEW CHANGE SCORE VARIABLE ----

# create change scores
BodySat$BodySatCha <- BodySat$BodySat18 - BodySat$BodySat10
```

SUMMARIZING DATA

= data frame name

= variable name

```
# INSPECT DATA ----

# summarize entire data frame (summarytools package)
dfSummary(BodySat)

# DESCRIPTIVE STATISTICS ----

# descriptive statistics for entire data frame (psych package)
describe(BodySat)
```

R OUTPUT

```
Data Frame Summary
BodySat
Dimensions: 882 x 2
Duplicates: 531

-----------------------------------------------------------------------------------------------
No   Variable    Stats / Values            Freqs (% of Valid)   Graph                 Valid      Missing
---- ----------- ------------------------- -------------------- --------------------- ---------- ---------
1    BodySat18   Mean (sd) : 25.4 (6.1)    28 distinct values                 :       882        0
     [integer]   min < med < max:                                        :  :       (100.0%)   (0.0%)
                 9 < 26 < 36                                       :  :  :     .
                 IQR (CV) : 7 (0.2)                                :  :  :  :  :  :
                                                         .  .  .  :  :  :  :  :  :

2    BodySat10   Mean (sd) : 28.5 (5.1)    27 distinct values                 :   .   882        0
     [integer]   min < med < max:                                        :  :  .  :  (100.0%)   (0.0%)
                 9 < 28 < 36                                       .  :  :  :  :
                 IQR (CV) : 7 (0.2)                                   .  :  :  :  :  :
                                                               .  .  :  :  :  :  :  :
-----------------------------------------------------------------------------------------------
```

R OUTPUT

	vars	n	mean	sd	median	trimmed	mad	min	max	range	skew	kurtosis	se
Participant	1	882	441.50	254.76	441.50	441.50	326.91	1.00	882.00	881.00	0.00	-1.20	8.58
ParentEduc*	2	882	2.27	0.80	2.00	2.34	1.48	1.00	3.00	2.00	-0.52	-1.26	0.03
ParentIncome*	3	882	2.38	1.11	2.00	2.35	1.48	1.00	4.00	3.00	0.12	-1.33	0.04
BMI10	4	882	19.60	4.22	18.48	19.11	3.57	12.37	35.16	22.79	1.10	0.94	0.14
SkinColorSat10	5	882	3.59	0.64	4.00	3.70	0.00	1.00	4.00	3.00	-1.58	2.41	0.02
SkinColorSat18	6	882	3.50	0.65	4.00	3.58	0.00	1.00	4.00	3.00	-1.36	2.36	0.02
BodySat10	7	882	28.49	5.14	28.00	28.83	5.93	9.00	36.00	27.00	-0.61	0.36	0.17
BodySat18	8	882	25.44	6.06	26.00	25.64	5.93	9.00	36.00	27.00	-0.33	0.10	0.20
BingeEatDisorder10	9	882	2.59	1.82	2.00	2.49	1.48	0.00	8.00	8.00	0.45	-0.35	0.06
BingeEatDisorder18	10	882	1.68	1.45	1.00	1.52	1.48	0.00	8.00	8.00	0.88	0.84	0.05
BodySatCha	11	882	-3.05	6.45	-3.00	-3.09	5.93	-27.00	24.00	51.00	0.11	0.73	0.22

PAIRED-SAMPLES T-TEST

= data frame name
= variable name

- The order that the variables are listed determines the calculation of the mean difference (e.g., listing BodySat18 first produces BodySat18 – BodySat10)

```
# T-TEST WITH TWO-TAILED ALTERNATE HYPOTHESIS ----

# paired t-test with default two-tailed alternate hypotheses (base R)
results <- t.test(BodySat$BodySat18, BodySat$BodySat10, paired = TRUE)
results

# print standard error
cat('standard error of mean difference:', results$stderr)
```

R OUTPUT

```
    Paired t-test

data:  BodySat$BodySat18 and BodySat$BodySat10
t = -14.037, df = 881, p-value < 2.2e-16
alternative hypothesis: true mean difference is not equal to 0

95 percent confidence interval:
 -3.472435 -2.620536

sample estimates:
mean difference
      -3.046485

standard error of mean difference: 0.2170266
```

t-statistic and p-value

95% confidence interval for mean difference

Raw mean difference

Standard error of mean difference

STANDARDIZED MEAN DIFFERENCE

= data frame name
= variable name
= grouping variable

```
# STANDARIZED MEAN DIFFERENCE EFFECT SIZE ----

# standardized mean difference effect size
cat('standardized mean difference effect size:',
  mean(BodySat$BodySatCha) / sd(BodySat$BodySatCha))
```

R OUTPUT

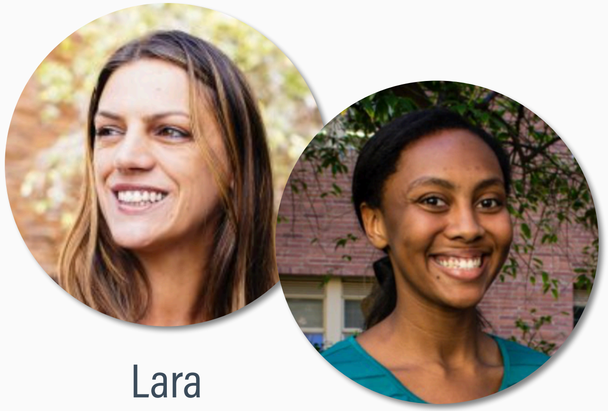
```
standardized mean difference effect size: -0.4726633
```

SMALL GROUP EXERCISE

Download two files from Bruin Learn: “Week 6 Lab. Paired t-Test.R” and “Week 6 Small Group Exercise.R”. The Lab script contains the R code we just discussed. The Exercise script contains only the URL for a different data set, ClinicalTrialData.csv. In groups of two or three, you will complete a series of R tasks that provide practice for the next assignment. There is no need to write code from scratch; instead, you can copy and paste code chunks from the Lab file into your Exercise script, modifying the data and variable names as needed. The ClinicalTrialData.csv file for this exercise contains data from a clinical trial investigating the impact of two medication regimens on smoking and drinking behavior.

SMOKING AND DRINKING CESSATION TRIAL

Pharmacological treatments that can concomitantly address cigarette smoking and heavy drinking stand to improve health care delivery for these highly prevalent co-occurring conditions. This superiority trial compared the combination of varenicline and naltrexone against varenicline alone for smoking cessation and drinking reduction among heavy-drinking smokers.



Lara Ray

ReJoyce Green

Ray, L.A., Green, R., Enders, C., et al. (2021). Efficacy of combining varenicline and naltrexone for smoking cessation and drinking reduction: A randomized clinical trial. *American Journal of Psychiatry*, *178*, 818–828.

KEY VARIABLES

Baseline breath carbon monoxide

A measure of carbon monoxide in the lungs. Breath carbon monoxide is a biomarker of smoking behavior common in clinical trials. Baseline scores represent pre-treatment smoking levels.

Week 8 breath carbon monoxide

Breath carbon monoxide was measured eights weeks after the start of the two medication regimes. Week 8 scores represent post-treatment smoking levels.

SMALL GROUP EXERCISE TASK 1

- Use the provided URL to import the ClinicalTrialData.csv file into an R data frame (import method #3 from the Week 0 lab script).
- Use the dfSummary function to get numeric and visual summaries of the data frame's variables.

SMALL GROUP EXERCISE TASK 2

- Create a new change variable called ChangeCO by computing COWeek8 minus COWeek0. This order facilitates interpretation because a negative value means that scores decreased over time whereas a positive value implies an increase.

- Use the describe function to get descriptive statistics for the entire sample.

SMALL GROUP EXERCISE TASK 3

- State and justify the hypotheses. Clearly write out the null hypothesis (H_0) and the alternative (research) hypothesis (H_1) in both statistical notation and plain language. Explain why a two-tailed test is appropriate for this study, even if the expected direction of change might seem obvious.

- Use the t.test function to perform a paired-samples t-test to determine whether smoking levels changed between the baseline assessment and the eight-week follow-up.

SMALL GROUP EXERCISE TASK 4

- Interpret the standard error of the mean difference. Explain what this value tells you about the precision of your estimated mean difference. How does it relate to the concept of sampling variability in repeated studies.

- Explain what the magnitude of the t-value tells you about how far the observed mean difference is from the null hypothesis.

- Explain what the magnitude of the p-value tells you about how far the observed mean difference is from the null hypothesis.

SMALL GROUP EXERCISE TASK 5

- Interpret the 95% confidence interval for the mean difference. Use the numeric values in your explanation. Relate your interpretation to the hypothesis test results—does the CI include the null hypothesis mean of 0?

- Provide an interpretation of the standardized mean difference effect size. Explain what the numeric value means and how it compares to Cohen's "off-the-shelf" benchmarks.