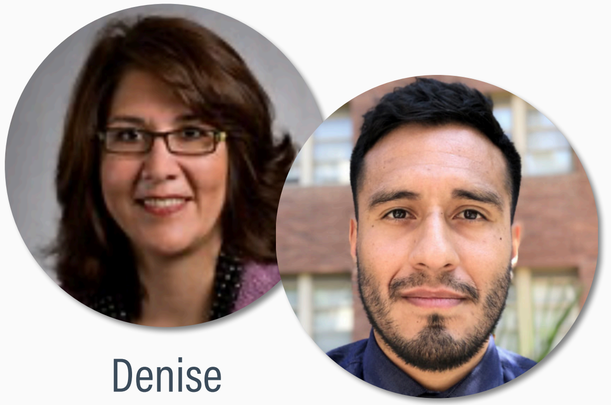
LAB WEEK 7

INDEPENDENT-SAMPLES T-TEST

DISCRIMINATION AND INTERNALIZING BEHAVIOR

There is a well-documented relationship between perceived discrimination and internalizing symptoms among Latinx adolescents. However, few studies have examined how this psychosocial stressor relates to multiple domains of functioning in rural Latinx adolescents simultaneously. This study tested a spillover model of internalizing symptom development, where the negative effects of perceived discrimination are experienced through peer and family relationships.



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Ramos, G., Delgadillo, D., Fossum, J., Montoya, A.K., Thamrin, H., Rapp, A., Escovar, E., Chavira, D.A. (2021). Discrimination and internalizing symptoms in rural Latinx adolescents: An ecological model of etiology. *Children and Youth Services Review*, *130*, 1-10.

KEY VARIABLES

Perceived Discrimination

Perceived discrimination refers to individuals' perception of negative attitude, judgment, or unfair treatment due to their specific characteristics such as gender, race, ethnicity, and social status.

Gender

Respondents self-reported their biological gender.

RESEARCH QUESTION

- Question: Do male and female Latinx adolescents experience different levels of perceived discrimination?
- The study used a between-subjects design where perceived discrimination levels were compared in two distinct groups
- An independent t-test is appropriate for comparing two means from different subsamples

LOAD PACKAGES AND IMPORT DATA

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

```
# LOAD R PACKAGES ----

# load R packages
library(ggplot2)
library(Hmisc)
library(psych)
library(summarytools)

# READ DATA ----

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

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

SUMMARIZING DATA

= data frame name

= variable name

```
# INSPECT DATA ----

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

# DESCRIPTIVE STATISTICS ----

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

R OUTPUT

```
Data Frame Summary
Discrim
Dimensions: 165 x 2
Duplicates: 125

-------------------------------------------------------------------------------------------
No   Variable    Stats / Values                Freqs (% of Valid)   Graph          Valid      Missing
---- ----------- ----------------------------- -------------------- -------------- ---------- ---------
...

3    Gender           1. Female                 339 (53.1%)           IIIIIIIIII            639        0
     [factor]         2. Male                   300 (46.9%)           IIIIIIIII             (100.0%)   (0.0%)

4    Discrimination   Mean (sd) : 13.6 (4.5)    28 distinct values        :                 639        0
     [integer]        min < med < max:                                    : .               (100.0%)   (0.0%)
                      4 < 13 < 34                                       . : :
                      IQR (CV) : 5 (0.3)                                : : : :
                                                                      : : : : : . .
...
-------------------------------------------------------------------------------------------
```

R OUTPUT

	vars	n	mean	sd	median	trimmed	mad	min	max	range	skew	kurtosis	se
Participant	1	639	320.00	184.61	320	320.00	237.22	1	639	638	0.00	-1.21	7.30
Age	2	639	15.62	1.09	16	15.65	1.48	14	17	3	-0.12	-1.30	0.04
Gender*	3	639	1.47	0.50	1	1.46	0.00	1	2	1	0.12	-1.99	0.02
Discrimination	4	639	13.56	4.47	13	13.22	4.45	4	34	30	0.93	1.48	0.18
Victimization	5	639	2.33	3.39	1	1.67	1.48	0	33	33	3.08	15.66	0.13
Familism	6	639	27.63	6.10	29	28.09	5.93	6	39	33	-0.73	0.43	0.24
Internalizing	7	639	15.59	11.16	13	14.41	10.38	0	62	62	1.02	0.98	0.44

DESCRIPTIVE STATISTICS BY GROUP

= data frame name
= variable name
= grouping variable

```
# DESCRIPTIVE STATISTICS BY GROUP ----

# summary statistics separately by group (psych package)
describeBy(Discrimination ~ Gender, data = Discrim)
```

R OUTPUT

```
 Descriptive statistics by group
Gender: Female
               vars   n  mean   sd median trimmed  mad min max range skew kurtosis   se
Discrimination    1 339 13.97 4.57     13    13.6 4.45   5  34    29 0.94     1.62 0.25
------------------------------------------------------------------------------------------
Gender: Male
               vars   n  mean   sd median trimmed  mad min max range skew kurtosis   se
Discrimination    1 300 13.11 4.32     12   12.77 3.71   4  31    27  0.9      1.2 0.25
```

INDEPENDENT-SAMPLES T-TEST

= data frame name
= variable name
= grouping variable

- The mean difference is computed by subtracting groups in alphabetical order (e.g., Varenicline – Varenicline + Naltrexone)

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

# independent t-test with default two-tailed alternate hypotheses (base R)
results <- t.test(Discrimination ~ Gender, data = Discrim)
results

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

R OUTPUT

```
    Welch Two Sample t-test

data:  Discrimination by Gender
t = 2.4377, df = 634.16, p-value = 0.01506
alternative hypothesis: true difference in means between
group Female and group Male is not equal to 0
```

t-statistic and p-value

```
95 percent confidence interval:
 0.1667374 1.5483659
```

95% confidence interval for mean difference

```
sample estimates:
mean in group Female   mean in group Male
            13.96755             13.11000
```

Means

```
standard error of mean difference: 0.35179
```

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 (psych package)
cohen.d(Discrimination ~ Gender, data = Discrim)
```

R OUTPUT

```
Cohen d statistic of difference between two means
                lower effect upper
Discrimination -0.35  -0.19 -0.04

Multivariate (Mahalanobis) distance between groups
[1] 0.19

r equivalent of difference between two means
Discrimination
          -0.1
```

SMALL GROUP EXERCISE

Download two files from Bruin Learn: “Week 7 Lab. Independent t-Test.R” and “Week 7 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, CancerData.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 CancerData.csv file for this exercise contains data from study investigating the impact of a cancer diagnosis on psychological outcomes like depression.

UVEAL MELANOMA AND DEPRESSION

Uveal melanoma, a rare eye cancer, presents potential vision loss and life threat. This prospective, longitudinal study interrogated the predictive utility of visual impairment, as moderated by optimism/pessimism, on depressive symptoms in 299 adults undergoing diagnostic evaluation.

Annette Stanton

James MacDonald

MacDonald, J.J., Jorge-Miller, A., Enders, C.K., McCannel, T., Beran, T., & Stanton, A.L. (2021). Perceived and objective visual impairment predicting depressive symptoms across one year in uveal melanoma diagnostic biopsy: Optimism and pessimism as moderators. *Health Psychology*, *40*, 408-417.

KEY VARIABLES

Depression

The CES-D is a 20-item inventory that asks people to rate how often they experience depressive symptoms such as restless sleep, poor appetite, and feeling lonely.

Cancer Diagnosis

Based on a diagnostic clinical evaluation for a possible intraocular malignancy, participants were classified as having malignant or nonmalignant diagnoses.

SMALL GROUP EXERCISE TASK 1

- Use the provided URL to import the CancerData.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

- Use the describeBy function to get descriptive statistics for the Depression dependent variable within each of the two Diagnosis groups (Non-Malignant vs. Malignant).

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 an independent-samples t-test to determine whether depression levels differ between participants to received positive versus negative diagnoses.

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.