**EPID 5314 - HW 11**

**Part 1:**

1. There is a significant difference between the slopes of alcohol behaviors over time by race/ethnicity (p < 0.0001 < 0.05).

Table

Description automatically generated

1. Race specific slopes and 95% CI are as follows:

Table

Description automatically generated

**Part 2:**

1. Since the repeated measures are taken for the same individual over time, and since it is assumed that the observation values would be expected to change less if taken closer together than those that are taken farther apart, I would think that the autoregressive (AR-1) covariance structure makes the most sense.
2. When the autoregressive covariance structure is used, there is a significant difference in slopes of alcohol behaviors by race/ethnicity (p < 0.0001 < 0.05).

Table

Description automatically generated

1. Race-specific slopes and corresponding 95% CI are as follows:

Table

Description automatically generated

**Part 3:**

1. D

**SAS Code**

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\* Course: Data Analysis - EPID 5314 \*

\* Assignment: Lab 11 \*

\* Due Date: 11/11/2021 \*

\* Programmer(s): Jessie Ausman \*

\* Program Name: Lab11 \*

\* Save Program/Log/Output: C:\Users\jessa\Desktop\EPID 5314\Lab11 \*

\* Save Data Files: C:\Users\jessa\Desktop\EPID 5314\PNC Data File\PNC Datasets \*

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/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* PART 0 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

libname bios "C:\Users\jessa\Desktop\EPID 5314\PNC Data File\PNC Datasets";

**data** base;

set bios.pnc02;

if race1 = **5** then race = "White"; \*1 = white;

if race1 = **2** then race = "Black"; \*2 = black;

if race1 = **3** then race = "Hisp"; \*3 = hispanic;

if race1 in (**1**,**4**,**6**) then race = "Other"; \*4 = other;

if misssing(race1) then race = **.**;

if race="White" then r1=**0**;

if race="White" then r2=**0**;

if race="White" then r3=**0**;

if race="Black" then r1=**1**;

if race="Black" then r2=**0**;

if race="Black" then r3=**0**;

if race="Hisp" then r1=**0**;

if race="Hisp" then r2=**1**;

if race="Hisp" then r3=**0**;

if race="Other" then r1=**0**;

if race="Other" then r2=**0**;

if race="Other" then r3=**1**;

time = **0**;

keep id race r1 r2 r3 time;

**run**;

**data** wave1;

set bios.pnc02;

/\*create alcohol behavior cont scale var\*/

alc = alcyear1 + alcmon1 + alcweek1 + hvyuse1 + drunk1;

\*if missing(alcyear2) or missing(alcmon2) or missing(alcweek2) or missing(hvyuse2) or missing(drunk2) then alc = .;

/\*create wave variable\*/

time = **0**;

**run**;

**data** wave2;

set bios.pnc03;

/\*create alcohol behavior cont scale var\*/

alc = alcyear2 + alcmon2 + alcweek2 + hvyuse2 + drunk2;

\*if missing(alcyear2) or missing(alcmon2) or missing(alcweek2) or missing(hvyuse2) or missing(drunk2) then alc = .;

/\*create wave variable\*/

time = **6**;

**run**;

**data** wave3;

set bios.pnc04;

/\*create alcohol behavior cont scale var\*/

alc = alcyear3 + alcmon3 + alcweek3 + hvyuse3 + drunk3;

\*if missing(alcyear3) or missing(alcmon3) or missing(alcweek3) or missing(hvyuse3) or missing(drunk3) then alc = .;

/\*create wave variable\*/

time = **18**;

**run**;

**data** wave4;

set bios.pnc05;

/\*create alcohol behavior cont scale var\*/

alc = alcyear4 + alcmon4 + alcweek4 + hvyuse4 + drunk4;

\*if missing(alcyear4) or missing(alcmon4) or missing(alcweek4) or missing(hvyuse4) or missing(drunk4) then alc = .;

/\*create wave variable\*/

time = **30**;

**run**;

**proc** **sort** data=wave2;

by id;

**run**;

**proc** **sort** data=wave3;

by id;

**run**;

**proc** **sort** data=wave4;

by id;

**run**;

**data** outcome;

set wave1-wave4;

by id;

keep id alc time;

**run**;

**proc** **sort** data=base;

by id;

**run**;

**data** Lab11;

merge base outcome;

by id;

**run**;

**data** Lab11\_1;

SET LAB11;

if race = "White" then racea = **0**;

else if race = "Black" then racea = **1**;

else if race = "Hisp" then racea = **2**;

else if race = "Other" then racea = **3**;

**run**;

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* PART 1 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

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dummy coding:

white r1 0 r2 0 r3 0

black r1 1 r2 0 r3 0

hispanic r1 0 r2 1 r3 0

other r1 0 r2 0 r3 1

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\*Q1: are the slopes for alcohol use behaviors different over time by race/ethnicity?;

**proc** **mixed** data= Lab11\_1;

class racea / ref=first;

model alc = racea time racea\*time/ s ddfm=BW;

random int time/ subject = id type=UN;

**run**;

\*Q2: what are race-specific slopes?;

**proc** **mixed** data= Lab11;

model alc = r1 r2 r3 time r1\*time r2\*time r3\*time/ s ddfm=BW;

random int time/ subject = id type=UN;

estimate "slope for white" time **1**;

estimate "slope for black" time **1** time\*r1 **1**;

estimate "slope for hispanic" time **1** time\*r2 **1**;

estimate "slope for other" time **1** time\*r3 **1**;

estimate "difference in slopes black vs. white" r1\*time **1** / CL;

estimate "difference in slopes hispanic vs. white" r2\*time **1** / CL;

estimate "difference in slopes other vs. white" r3\*time **1** / CL;

**run**;

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* PART 2 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

\*Q4: does slope vary by race if covariance structure = Autoregressive?;

**proc** **genmod** data=Lab11;

class id race (param=ref ref="White");

model alc = race time race\*time/ type3;

repeated subject = id / type = AR(**1**);

**run**;

\*Q5: race-specific slope estimates and differences between slopes if covariance structure = Autoregressive;

**proc** **genmod** data=Lab11;

class id race (param=ref ref="White");

model alc = race time race\*time/ type3;

repeated subject = id / type = AR(**1**);

estimate "slope for white" time **1**;

estimate "slope for black" time **1** time\*race **1** **0** **0**;

estimate "slope for hispanic" time **1** time\*race **0** **1** **0**;

estimate "slope for hispanic" time **1** time\*race **0** **0** **1**;

**run**;

/\*unstructured covariance\*/

\*Q4: does slope vary by race if covariance structure = Autoregressive?;

**proc** **genmod** data=Lab11;

class id race (param=ref ref="White");

model alc = race time race\*time/ type3;

repeated subject = id / type = UN;

**run**;

\*Q5: race-specific slope estimates and differences between slopes if covariance structure = Autoregressive;

**proc** **genmod** data=Lab11;

class id race (param=ref ref="White");

model alc = race time race\*time/ type3;

repeated subject = id / type = UN;

estimate "slope for white" time **1**;

estimate "slope for black" time **1** time\*race **1** **0** **0**;

estimate "slope for hispanic" time **1** time\*race **0** **1** **0**;

estimate "slope for hispanic" time **1** time\*race **0** **0** **1**;

**run**;

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* PART 3 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/