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36-402/608 ADA-II
Breakout #18 Results

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These data come from “Estimating actor, partner, and interaction effects for dyadic data using PROC MIXED and HLM: A user-friendly guide”, by Campbell and Kashy, *Personal Relationships*, 9 (2002), p 327.

Here are the first few lines of data:

```
id wdraw asecure agen psecure pgen cond
001 3 7 1 6 -1 -1
001 4 6 -1 7 1 -1
002 6 5 1 4 -1 -1
002 4 4 -1 5 1 -1
```

Heterosexual couples were studied in a lab while discussing either a major or minor problem (randomly assigned). “id” is the dyad identification code, wdraw is the outcome (observer rating of emotional withdrawal; “asecure” and “psecure” are measures of “attachment security” for “actors” and “partners” respectively; “agen” and “pgen” are “gender” for “actors” and “partners” respectively with code 1=male, -1=female; and “cond” is randomly assigned treatment condition with code 1=major problem and 2=minor problem.

Question 1: Why would any model use agen or pgen, but not both?

Here is the SAS code for the first analysis:

```
OPTIONS LINESIZE=70;
DATA IN;
  INFILE "Withdrawal.dat" firstobs=2 termstr=CRLF;
  INPUT id wdraw asecure0 agen psecure0 pgen cond;
RUN;

/* Center "secure" */
PROC SQL;
  CREATE TABLE WD AS
  SELECT id, wdraw, asecure0-mean(asecure0) as asecure,
         agen, psecure0-mean(psecure0) as psecure, cond
  FROM IN;
QUIT;
```

```

PROC MIXED;
  CLASS ID;
  MODEL wdraw = asecure psecure agen cond/ SOLUTION DDFM=SATTERTH;
  RANDOM INT / SUBJECT=id TYPE=UN G V V CORR;
  TITLE "PROC MIXED example: as random intercept";
RUN;

```

Log file: NOTE: Convergence criteria met.

```

                        Model Information
Data Set                WORK.WD
Dependent Variable     wdraw
Covariance Structure   Unstructured
Subject Effect         id
Estimation Method      REML
Degrees of Freedom Method Satterthwaite

```

```

                        Class Level Information
Class   Levels   Values
id      16      1 2 3 4 5 6 7 8 9 10 11 12 13
                14 15 16

```

```

                        Dimensions
Covariance Parameters      2
Columns in X                5
Columns in Z Per Subject   1
Subjects                    16
Max Obs Per Subject        2
Number of Observations Used 32

```

Convergence criteria met.

```

                        Estimated G Matrix
Row   Effect      id      Col1
1     Intercept   1      0.8213

```

```

Estimated V Matrix for id 1
Row      Col1      Col2
1        1.2206    0.8213
2        0.8213    1.2206

```

Estimated V Correlation

Matrix for id 1

| Row | Col1 | Col2 |
|-----|--------|--------|
| 1 | 1.0000 | 0.6729 |
| 2 | 0.6729 | 1.0000 |

Covariance Parameter Estimates

| Cov Parm | Subject | Estimate |
|----------|---------|----------|
| UN(1,1) | id | 0.8213 |
| Residual | | 0.3993 |

Fit Statistics

BIC (smaller is better) 96.9

Solution for Fixed Effects

| Effect | Estimate | Standard Error | DF | t Value | Pr > t |
|-----------|----------|----------------|------|---------|---------|
| Intercept | 5.5625 | 0.2526 | 13 | 22.02 | <.0001 |
| asecure | 0.1152 | 0.1502 | 18.6 | 0.77 | 0.4525 |
| psecure | -0.6254 | 0.1502 | 18.6 | -4.16 | 0.0005 |
| agen | 0.1181 | 0.1123 | 14 | 1.05 | 0.3111 |
| cond | 0.9433 | 0.3647 | 13 | 2.59 | 0.0226 |

Note that the Satterthwaite df method (or the similar KR method) are better than the default (in the sense of better achieving appropriate type-1 error rates and improving power.)

Question 2: Which output corresponds to G, V, and VCORR? What calculation from which values in the output gives the correlation value of 0.6729? What does this number mean?

Question 3: We must test if the intra-dyad correlation is significant? How?

Question 4: What do each of the Estimates tell us, including the intercept?

Here is an alternative analysis:

```
PROC MIXED;  
  CLASS id;  
  MODEL wdraw = asecure psecure agen cond/ SOLUTION DDFM=SATTERTH;  
  REPEATED / TYPE=CS SUBJECT=id R RCORR;  
  TITLE "PROC MIXED example: model includes only main effects";  
RUN;
```

Model Information

| | |
|---------------------------|-------------------|
| Covariance Structure | Compound Symmetry |
| Subject Effect | id |
| Estimation Method | REML |
| Degrees of Freedom Method | Satterthwaite |

Dimensions

| | |
|-----------------------|---|
| Covariance Parameters | 2 |
| Columns in X | 5 |
| Columns in Z | 0 |

Convergence criteria met.

Estimated R Matrix for id 1

| Row | Col1 | Col2 |
|-----|--------|--------|
| 1 | 1.2206 | 0.8213 |
| 2 | 0.8213 | 1.2206 |

Estimated R Correlation

Matrix for id 1

| Row | Col1 | Col2 |
|-----|--------|--------|
| 1 | 1.0000 | 0.6729 |
| 2 | 0.6729 | 1.0000 |

Covariance Parameter Estimates

| Cov Parm | Subject | Estimate |
|----------|---------|----------|
| CS | id | 0.8213 |
| Residual | | 0.3993 |

Fit Statistics

| | |
|-------------------------|------|
| BIC (smaller is better) | 96.9 |
|-------------------------|------|

| Solution for Fixed Effects | | | | | |
|----------------------------|----------|----------------|------|---------|---------|
| Effect | Estimate | Standard Error | DF | t Value | Pr > t |
| Intercept | 5.5625 | 0.2526 | 13 | 22.02 | <.0001 |
| asecure | 0.1152 | 0.1502 | 18.6 | 0.77 | 0.4525 |
| psecure | -0.6254 | 0.1502 | 18.6 | -4.16 | 0.0005 |
| agen | 0.1181 | 0.1123 | 14 | 1.05 | 0.3111 |
| cond | 0.9433 | 0.3647 | 13 | 2.59 | 0.0226 |

Question 5: What is the same and what is different from the first analysis? Using today's handout, explain what is going on.

Here is another analysis:

```

DATA WD;
  SET WD;
  aconsec = cond*asecure;
  pconsec = cond*psecure;
run;

PROC MIXED;
  CLASS id;
  MODEL wdraw = asecur psecure agen cond aconsec pconsec /
    SOLUTION DDFM=SATTERTH;
  REPEATED / TYPE=CS SUBJECT=id RCORR;
  TITLE "Mystery model";
RUN;

```

Question 6: What does this code model?

Columns in X 7
Convergence criteria met.

Estimated R Correlation

| Row | Col1 | Col2 |
|-----|--------|--------|
| 1 | 1.0000 | 0.5543 |
| 2 | 0.5543 | 1.0000 |

BIC (smaller is better) 95.9

Solution for Fixed Effects

| Effect | Estimate | Standard Error | DF | t Value | Pr > t |
|-----------|----------|----------------|------|---------|---------|
| Intercept | 6.1369 | 0.3158 | 12 | 19.43 | <.0001 |
| asecure | 0.03733 | 0.1372 | 18.9 | 0.27 | 0.7885 |
| psecure | -0.7148 | 0.1372 | 18.9 | -5.21 | <.0001 |
| agen | 0.1101 | 0.1161 | 13 | 0.95 | 0.3605 |
| cond | 0.7812 | 0.3158 | 12 | 2.47 | 0.0293 |
| aconsec | 0.2597 | 0.1372 | 18.9 | 1.89 | 0.0738 |
| pconsec | 0.3333 | 0.1372 | 18.9 | 2.43 | 0.0253 |

Question 7: How do you interpret the results?