Descriptions of the Variables Used in the Current Analysis

Variable	Label	Is the Variable Time Varying?
AID	Respondent's ID	N
Dtime	Respondent's Age At Each Interview Centered at Age 15	Y
Weight	Respondent's Weight in lbs At Each Interview	Y
TV	Hours of TV Watched a Week	Y
Female	Respondent's Sex	N

This analysis is for teaching purposes only.

PROC MIXED tells SAS to do a mixture model. The NOCLPRINT option tells SAS not to print CLASS level information. The COVTEST option has SAS show hypothesis tests for the variance and covariance parts of the model in the output.

The MODEL statement tells SAS which variables are the fixed effects and the RANDOM statement indicates the random effects.

The TYPE option tells SAS the structure of the variance-covariance matrix which in this case is UN or unstructured.

The CLASS option tells SAS what is the ID variable. In this case it is "aid".

The SOLUTION option tells SAS to show the estimates of the Fixed Effects in the output.

Syntax

```
proc mixed noclprint covtest;
class aid;
model weight = dtime female tv  female*dtime
tv*dtime / solution ddfm=bw notest;
random intercept time tv/ subject =aid
type=un;
run;
```

The SAS System 09:06 Wednesday

The Mixed Procedure

Model Information

Data Set	A.C
Dependent Variable	weight
Covariance Structure	Unstructured
Subject Effect	AID
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Between-Within

Dimensions

Covariance Parameters	7
Columns in X	6
Columns in Z Per Subject	3
Subjects	1100
Max Obs Per Subject	3

Number of Observations

Number of Observations Read	3300
Number of Observations Used	3224
Number of Observations Not Used	76

Iteration History

Iteration	Evaluations	-2 Res Log Like	Criterion
0	1	32000.15128648	
1	4	28561.12140773	.
2	1	28524.03439001	.
3	1	28499.58115494	.
4	1	28492.63352258	0.00005495
5	1	28491.94030257	0.00000272
6	1	28491.90831020	0.00000001
7	1	28491.90817584	0.00000000

Convergence criteria met.

In this example, we can expect to see 7 covariance estimates on the next page of the output. This is based on the how many variables are we specified as "random" plus an error term.

'Subjects' tells you how many people are in your sample. This is a good check to make sure your sample size is what you expect. Also, we can tell the maxim times a respondent has been measured. In this case, each respondent contributes information at three time points: age 15, 16, and 17.

Number of observations is the number of respondents times how many points in time they are measured. Often observations are not used because the information is missing at one time point. For example, a respondent can have valid information at age 15 and 16 but not interviewed at age 17. This respondent will still contribute to the estimation of the growth curve.

This shows you how many iterations were needed for the model to converge. The note at the bottom shows us that the model did actually converge.

Here are the results for the covariance parameter for the variables made random in our syntax. The numbers correspond with the order they are in the syntax. For example: 1,1 is the variance of the intercept and 2,1 is the covariance of the intercept and slope.

The Mixed Procedure

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr Z
UN(1,1)	AID	3082.44	198.34	15.54	<.0001
UN(2,1)	AID	-159.18	10.8849	-14.62	<.0001
UN(2,2)	AID	11.6809	0.6819	17.13	<.0001
UN(3,1)	AID	0.1927	1.3624	0.14	0.8875
UN(3,2)	AID	-0.00985	0.07751	-0.13	0.8989
UN(3,3)	AID	0.008337	0.01025	0.81	0.2081
Residual		68.0319	3.2047	21.23	<.0001

This is the variance component of the intercept. This suggests that there is still variation in the intercept that is not explained by the current model. The slope variance (2,2) is also significant and can be interpreted in the same manner. TV watching (3,3) is not significant which means there is no variation in TV watching to be explained by adding to the model.

This is called the within-person variance. When it is significant, it suggests that the estimated model has not explained the within-person variation. Another way to think about it is that other time-varying predictors can be added to the model to try and explain this variation.

These are the fit statistics and are used to determine if adding variables improves the model fit. Smaller numbers suggest better fit.

Fit Statistics

-2 Res Log Likelihood	28491.9
AIC (smaller is better)	28505.9
AICC (smaller is better)	28505.9
BIC (smaller is better)	28540.9

This test should be significant if this model is better than an OLS model.

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
6	3508.24	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	152.86	1.4634	1098	104.46	<.0001
dtime	4.8118	0.2161	2120	22.27	<.0001
female	-19.8438	1.9024	1098	-10.43	<.0001
tv	-0.00118	0.02274	2120	-0.05	0.9588
dtime*female	-1.7460	0.2392	2120	-7.30	<.0001
dtime*tv	0.01408	0.009281	2120	1.52	0.1295

Since our time variable is centered at age 15 the intercept can be interpreted at the average weight of males at age 15 who does watch TV.

Net of the other predictors females weight 20 Lbs less than males at age 15.

Time can be thought of as the slope and is interpreted as the change in weight for males every year net of the time-varying predictors (e.g. hours of TV watching). On average, males increase in weight by 4.81 pounds ever year.

Watching TV is not significantly related to weight at age 15.

When variables are interacted with time it can be thought of as the slope or rate of growth for that variable. Females increase their weight 1.7 pounds less than males every year. Or females increase in weight by 3.1 pounds a year (4.8-1.7=3.1).

The amount of time a respondent watches TV is not significantly related to an increase in weight over time.