

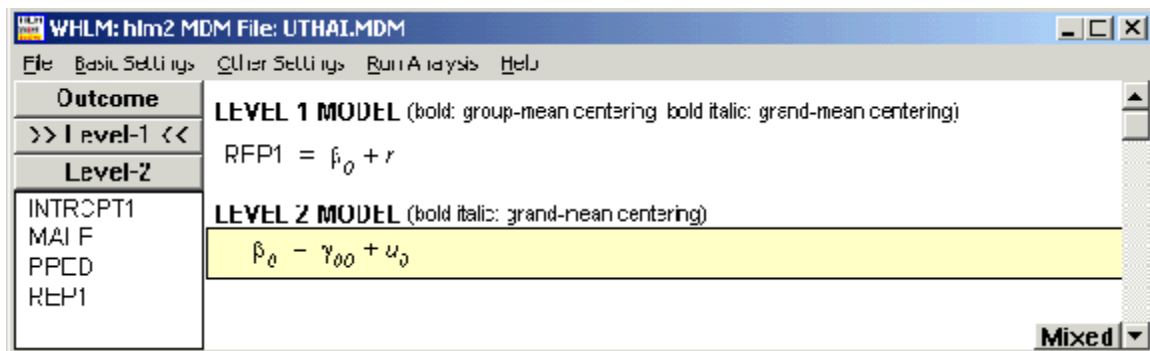
Specify a Bernoulli model

For a description of the statistical background of the Bernoulli model, please see two- and three-level models for binary outcomes.

Specifying a Bernoulli model

The Thailand data described elsewhere is used as illustration. Of interest is the probability that a child will repeat a grade during the primary years (REP1 = 1 if yes, 0 if no). Every level-1 record corresponds to a student, with a single binary outcome per student, so the model type is Bernoulli.

After specifying the outcome in the model specification window (REP1 in our example), click the **Outcome** button at the top of the variable list box to the left of the main HLM window to open the **Basic Model Specifications – HLM2** dialog box.



Select **Bernoulli (0 or 1)** as there is one binary outcome per level-1 unit.

Basic Model Specifications - HLM2

Distribution of Outcome Variable

Normal (Continuous)
 Bernoulli (0 or 1)
 Poisson (constant exposure)

Binomial (number of trials) None
 Poisson (variable exposure)

Multinomial Number of categories
 Ordinal

Over dispersion

Title

Output file name

Graph file name

Select the **Iteration Settings** option from the **Other Settings** menu to access the **Iteration Settings – HLM2** dialog box on which the maximum number of macro and micro iterations can be specified. In the example below, 20 micro and 50 macro iterations were requested. Also, should this maximum be reached without convergence being achieved, the program is instructed to **Continue iterating**. Click **OK** to return to the main WHLM window.

Iteration Control - HLM2

Number of (micro) iterations

Number of macro iterations

Frequency of accelerator

% change to stop iterating

How to handle bad Tau(0)

Set off diagonals to 0
 Manual reset
 Automatic fixup

What to do when maximum number of iterations achieved without convergence

Prompt Continue iterating Stop iterating

For Bernoulli models, Laplace estimation is also available. To request Laplace approximation and set the number of Laplace iterations, select the **Estimation Settings** option from the **Other Settings** menu to open the **Estimation Settings – HLM2** dialog box. Select **Laplace approximation** by selecting this option, and provide the maximum number of iterations required in the **Maximum number of iterations** field. Click **OK** to return to the main WHLM window.

Estimation Settings - HLM2

Type of Likelihood

Restricted maximum likelihood Full maximum likelihood

LaPlace Iteration Control

Do Laplace iterations Maximum number of iterations

EM LaPlace Iteration Control

Do EM Laplace iterations Maximum number of iterations

Constraint of fixed effects Heterogeneous sigma² Plausible values Multiple imputation

Level-1 Deletion Variables Weighting Latent Variable Regression

Fix sigma² to specific value

(Set to "computed" if you want sigma² random or if over-dispersion is desired)

OK

The model described above is displayed below in both standard and mixed model notation. Run the analysis by clicking the **Run Analysis** option on the main menu bar of the WHLM window.

WHLM: hlm2 MDM File: UTHAI.MDM

File Basic Settings Other Settings Run Analysis Help

Outcome

>> Level-1 <<

Level-2

INTRCPT1
MALE
PPED
RCP1

LEVEL 1 MODEL (bold: group-mean centering; bold italic: grand-mean centering)

Prob($H=1|\beta$) = ϕ
 $\text{Log}[\phi/(1 - \phi)] = \eta$
 $\eta = \beta_0$

LEVEL 2 MODEL (bold italic: grand-mean centering)

$\beta_0 = \gamma_{00} + u_0$

Mixed

Mixed Model

$\eta = \gamma_{00} + u_0$

The output file will, in addition to the usual estimates, contain a number of references to the type of model selected for the outcome. See here for partial output of the model.

hlm6