MPlus Analysis Examples Replication Chapter 10

Mplus includes all input code and output in the *.out file. This document contains selected output from each analysis for Chapter 10. All data preparation and management was done using SAS and read into Mplus using a text file format produced by SAS.

Some options available in Stata or other software presented in Chapter 10 including Kaplan-Meier curves and the Clog-log logistic model for comparison to the logit model are not available in Mplus. As a result, they are not included in this document.

Mplus VERSION 7.4
MUTHEN & MUTHEN
04/09/2025   9:32 AM

INPUT INSTRUCTIONS

```
   TITLE: ASDA 3 EXAMPLE 10.4.5 NCSR DATA SURVIVAL ANALYSIS COX MODEL

   DATA:
   FILE IS "P:\ASDA3\replication mplus\ncsr_c10_mplus.txt";
   VARIABLE:
   NAMES ARE
    AGE CASEID DSM_SO ED4CAT MAR3CAT MDE_OND NCSRWTLG NCSRWTSH OBESE6CA
    REGION SECLUSTR SESTRAT SEX SO_OND WKSTAT3C ag60
    ag1829 ag3044 ag4559 ag4cat ageonsetmde ald black ed011 ed12 ed16 ed1315
    hisp intwage married mde ncsrwtsh100 nevmar
    numsecu other prevmar racecat sexf sexm white;

  USEVARIABLES ARE sestrat numsecu ncsrwtsh ageonsetmde mde
   age sexm prevmar nevmar ed12 ed1315 ed16 hisp black white;

   missing are . ;
   WEIGHT IS ncsrwtsh ;
   stratification is sestrat ;
   cluster is numsecu ;
   survival=ageonsetmde (all) ;
   timecensored=mde (0=right 1=not) ;

   ANALYSIS:
   type is complex;

   Model:
   ageonsetmde on age sexm prevmar nevmar ed12 ed1315 ed16 hisp black white ;
   ! Note: use exp for hazard ratios ;
   Output: cint ;
```

*** WARNING in VARIABLE command
  Note that only the first 8 characters of variable names are used in the output.
  Shorten variable names to avoid any confusion.
   1 WARNING(S) FOUND IN THE INPUT INSTRUCTIONS

ASDA 3 EXAMPLE 10.4.5 NCSR DATA SURVIVAL ANALYSIS COX MODEL

SUMMARY OF ANALYSIS

Number of groups	1
Number of observations	9282
Number of dependent variables	1
Number of independent variables	10
Number of continuous latent variables	0

Observed dependent variables

  Time-to-event (survival)

```
    Non-parametric
     AGEONSET

Observed independent variables
   AGE         SEXM        PREVMAR     NEVMAR      ED12        ED1315
   ED16        HISP        BLACK       WHITE

Variables with special functions

  Stratification        SESTRAT
  Cluster variable      NUMSECU
  Weight variable       NCSRWTSH

  Time-censoring variables
   MDE


Estimator                                                    MLR
Information matrix                                      OBSERVED
Optimization Specifications for the Quasi-Newton Algorithm for
Continuous Outcomes
  Maximum number of iterations                               100
  Convergence criterion                                0.100D-05
Optimization Specifications for the EM Algorithm
  Maximum number of iterations                               500
  Convergence criteria
    Loglikelihood change                               0.100D-02
    Relative loglikelihood change                      0.100D-05
    Derivative                                         0.100D-02
Optimization Specifications for the M step of the EM Algorithm for
Categorical Latent variables
  Number of M step iterations                                  1
  M step convergence criterion                         0.100D-02
  Basis for M step termination                         ITERATION
Optimization Specifications for the M step of the EM Algorithm for
Censored, Binary or Ordered Categorical (Ordinal), Unordered
Categorical (Nominal) and Count Outcomes
  Number of M step iterations                                  1
  M step convergence criterion                         0.100D-02
  Basis for M step termination                         ITERATION
  Maximum value for logit thresholds                          15
  Minimum value for logit thresholds                         -15
  Minimum expected cell size for chi-square            0.100D-01
Maximum number of iterations for H1                         2000
Convergence criterion for H1                           0.100D-03
Optimization algorithm                                       EMA
Integration Specifications
  Type                                                  STANDARD
  Number of integration points                                15
  Dimensions of numerical integration                          0
  Adaptive quadrature                                         ON
Base Hazard                                                  OFF
Cholesky                                                     OFF

Input data file(s)
  P:\ASDA3\replication mplus\ncsr_c10_mplus.txt
Input data format  FREE
```

SUMMARY OF DATA

Number of strata	42
Number of clusters	84

COVARIANCE COVERAGE OF DATA

Minimum covariance coverage value 0.100

THE MODEL ESTIMATION TERMINATED NORMALLY

MODEL FIT INFORMATION

Number of Free Parameters 10

Loglikelihood

H0 Value	-10578.163
H0 Scaling Correction Factor for MLR	1.1498

Information Criteria

Akaike (AIC)	21176.327
Bayesian (BIC)	21247.685
Sample-Size Adjusted BIC (n* = (n + 2) / 24)	21215.906

MODEL RESULTS

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
AGEONSETMD ON				
AGE	-0.050	0.002	-20.802	0.000
SEXM	-0.454	0.062	-7.280	0.000
PREVMAR	0.502	0.060	8.371	0.000
NEVMAR	0.081	0.089	0.908	0.364
ED12	-0.057	0.067	-0.848	0.396
ED1315	0.046	0.058	0.787	0.431
ED16	-0.090	0.064	-1.417	0.157
HISP	-0.250	0.134	-1.860	0.063
BLACK	-0.479	0.149	-3.216	0.001
WHITE	0.078	0.117	0.662	0.508

QUALITY OF NUMERICAL RESULTS

Condition Number for the Information Matrix (ratio of smallest to largest eigenvalue)	0.870E-04

CONFIDENCE INTERVALS OF MODEL RESULTS

	Lower .5%	Lower 2.5%	Lower 5%	Estimate	Upper 5%	Upper 2.5%	Upper .5%
AGEONSET ON							
AGE	-0.056	-0.054	-0.053	-0.050	-0.046	-0.045	-0.043
SEXM	-0.614	-0.576	-0.556	-0.454	-0.351	-0.331	-0.293
PREVMAR	0.348	0.385	0.404	0.502	0.601	0.620	0.657
NEVMAR	-0.148	-0.093	-0.066	0.081	0.227	0.255	0.309
ED12	-0.230	-0.188	-0.167	-0.057	0.053	0.075	0.116
ED1315	-0.104	-0.068	-0.050	0.046	0.141	0.159	0.195
ED16	-0.254	-0.215	-0.195	-0.090	0.015	0.035	0.074
HISP	-0.596	-0.513	-0.471	-0.250	-0.029	0.013	0.096
BLACK	-0.863	-0.771	-0.724	-0.479	-0.234	-0.187	-0.095
WHITE	-0.225	-0.152	-0.115	0.078	0.271	0.308	0.380

DIAGRAM INFORMATION

Use View Diagram under the Diagram menu in the Mplus Editor to view the diagram.
If running Mplus from the Mplus Diagrammer, the diagram opens automatically.

Diagram output
p:\asda3\replication mplus\chapter 10\c10 cox model with ncsr data.dgm

Beginning Time: 09:32:13
Ending Time: 09:32:16
Elapsed Time: 00:00:03

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Mplus VERSION 7.4
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INPUT INSTRUCTIONS

```
   TITLE: ASDA3 EXAMPLE 10.2 DISCRETE TIME LOGISTIC MODEL
   ! USE CHAPTER 10 DISCRETE TIME DATA SET PREPARED IN SAS
   DATA:
   FILE IS "P:\asda3\replication mplus\ncsr_c10dt_mplus.txt";
   VARIABLE:
   NAMES ARE
   DSM_SO ED4CAT MAR3CAT MDE_OND OBESE6CA SO_OND WKSTAT3C
   ag60 ag1829 ag3044 ag4559 ag4cat age ageonsetmde ald black caseid
   ed011 ed12 ed16 ed1315 hisp intwage married mde mdetv
   ncsrwtlg ncsrwtsh ncsrwtsh100 nevmar numsecu other prevmar pyr
   racecat region seclustr sestrat sex sexf sexm white;

   USEVARIABLES ARE numsecu mdetv pyr age sexm ed12 ed1315 ed16 hisp
   black white prevmar nevmar ageonsetmde ;
   missing are . ;
   WEIGHT IS ncsrwtsh ;
   stratification is sestrat ;
   cluster is numsecu ;
   subpopulation =(pyr <= ageonsetmde) ;
   categorical = mdetv ;
   ANALYSIS:
   type is complex;
   estimator=mlr ;
   Model:
   mdetv on pyr age sexm ed12 ed1315 ed16 hisp black white prevmar nevmar ;
```

```
*** WARNING in VARIABLE command
  Note that only the first 8 characters of variable names are used in the output.
  Shorten variable names to avoid any confusion.
*** WARNING in MODEL command
  Variable is uncorrelated with all other variables:  AGEONSETMDE
*** WARNING in MODEL command
  At least one variable is uncorrelated with all other variables in the model.
  Check that this is what is intended.
   3 WARNING(S) FOUND IN THE INPUT INSTRUCTIONS
```

ASDA3 EXAMPLE 10.2 DISCRETE TIME LOGISTIC MODEL

SUMMARY OF ANALYSIS

Number of groups	1
Number of observations	385696
Number of dependent variables	2
Number of independent variables	11
Number of continuous latent variables	0

Observed dependent variables

```
  Continuous
   AGEONSETMD

  Binary and ordered categorical (ordinal)
   MDETV

Observed independent variables
   PYR         AGE         SEXM        ED12        ED1315      ED16
   HISP        BLACK       WHITE       PREVMAR     NEVMAR

Variables with special functions

  Stratification        SESTRAT
  Cluster variable      NUMSECU
  Weight variable       NCSRWTSH

Estimator                                                    MLR
Information matrix                                      OBSERVED
Optimization Specifications for the Quasi-Newton Algorithm for
Continuous Outcomes
  Maximum number of iterations                               100
  Convergence criterion                                0.100D-05
Optimization Specifications for the EM Algorithm
  Maximum number of iterations                               500
  Convergence criteria
    Loglikelihood change                               0.100D-02
    Relative loglikelihood change                      0.100D-05
    Derivative                                         0.100D-02
Optimization Specifications for the M step of the EM Algorithm for
Categorical Latent variables
  Number of M step iterations                                  1
  M step convergence criterion                         0.100D-02
  Basis for M step termination                         ITERATION
Optimization Specifications for the M step of the EM Algorithm for
Censored, Binary or Ordered Categorical (Ordinal), Unordered
Categorical (Nominal) and Count Outcomes
  Number of M step iterations                                  1
  M step convergence criterion                         0.100D-02
  Basis for M step termination                         ITERATION
  Maximum value for logit thresholds                          15
  Minimum value for logit thresholds                         -15
  Minimum expected cell size for chi-square            0.100D-01
Maximum number of iterations for H1                        2000
Convergence criterion for H1                           0.100D-03
Optimization algorithm                                       EMA
Integration Specifications
  Type                                                  STANDARD
  Number of integration points                                15
  Dimensions of numerical integration                          0
  Adaptive quadrature                                         ON
Link                                                       LOGIT
Cholesky                                                     OFF

Input data file(s)
  P:\asda3\replication mplus\ncsr_c10dt_mplus.txt
Input data format  FREE
```

SUMMARY OF DATA

Number of missing data patterns	1
Number of y missing data patterns	1
Number of u missing data patterns	1
Number of strata	42
Number of clusters	84

UNIVARIATE PROPORTIONS AND COUNTS FOR CATEGORICAL VARIABLES

MDETV

Category 1	0.995	383921.918
Category 2	0.005	1774.082

THE MODEL ESTIMATION TERMINATED NORMALLY

MODEL FIT INFORMATION

Number of Free Parameters 14

Loglikelihood

H0 Value	-1690195.042
H0 Scaling Correction Factor for MLR	18.1004

Information Criteria

Akaike (AIC)	3380418.084
Bayesian (BIC)	3380570.163
Sample-Size Adjusted BIC (n* = (n + 2) / 24)	3380525.671

MODEL RESULTS

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
MDETV ON				
PYR	0.033	0.002	15.816	0.000
AGE	-0.058	0.002	-23.823	0.000
SEXM	-0.445	0.062	-7.142	0.000
ED12	-0.020	0.066	-0.305	0.761
ED1315	0.093	0.057	1.618	0.106
ED16	-0.019	0.063	-0.307	0.759
HISP	-0.248	0.135	-1.843	0.065
BLACK	-0.457	0.150	-3.049	0.002
WHITE	0.074	0.118	0.626	0.531
PREVMAR	0.494	0.061	8.101	0.000
NEVMAR	-0.035	0.088	-0.402	0.688
Means				
AGEONSETMD	50.356	0.370	136.029	0.000
Thresholds				
MDETV$1	3.436	0.162	21.209	0.000
Variances				
AGEONSETMD	354.439	7.689	46.095	0.000

LOGISTIC REGRESSION ODDS RATIO RESULTS

MDETV ON	
PYR	1.033
AGE	0.943
SEXM	0.641
ED12	0.980
ED1315	1.097
ED16	0.981
HISP	0.780
BLACK	0.633
WHITE	1.077
PREVMAR	1.639
NEVMAR	0.965

QUALITY OF NUMERICAL RESULTS

Condition Number for the Information Matrix 0.412E-05
(ratio of smallest to largest eigenvalue)

DIAGRAM INFORMATION

Use View Diagram under the Diagram menu in the Mplus Editor to view the diagram.
If running Mplus from the Mplus Diagrammer, the diagram opens automatically.

Diagram output
p:\asda3\replication mplus\chapter 10\c10 discrete time model with ncsr data.dgm

Beginning Time: 09:41:12

Ending Time: 09:42:37
Elapsed Time: 00:01:25

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