**Appendix**

SPSS Code for Models M1-M6 used in this tutorial

\*\*M1 unconditional means model\*\*

MIXED

 qualrec

 /CRITERIA = CIN(95) MXITER(100) MXSTEP(5) SCORING(1) SINGULAR(0.000000000001) HCONVERGE(0, ABSOLUTE) LCONVERGE(0, ABSOLUTE)

 PCONVERGE(0.000001, ABSOLUTE)

 /FIXED = | SSTYPE(3)

 /METHOD = REML

 /PRINT = CORB COVB DESCRIPTIVES SOLUTION TESTCOV

 /RANDOM INTERCEPT | SUBJECT(anes\_id) COVTYPE(VC) .

\*\*M2: level one predictors\*\*

MIXED

 qualrec with age preop\_ps

 /CRITERIA = CIN(95) MXITER(100) MXSTEP(5) SCORING(1) SINGULAR(0.000000000001) HCONVERGE(0, ABSOLUTE) LCONVERGE(0, ABSOLUTE)

 PCONVERGE(0.000001, ABSOLUTE)

 /FIXED = age preop\_ps | SSTYPE(3)

 /METHOD = REML

 /PRINT = CORB COVB DESCRIPTIVES SOLUTION TESTCOV

 /RANDOM INTERCEPT | SUBJECT(anes\_id) COVTYPE(VC) .

\*\*M3: with level two predictors\*\*

MIXED

 qualrec with age preop\_ps hospital

 /CRITERIA = CIN(95) MXITER(100) MXSTEP(5) SCORING(1) SINGULAR(0.000000000001) HCONVERGE(0, ABSOLUTE) LCONVERGE(0, ABSOLUTE)

 PCONVERGE(0.000001, ABSOLUTE)

 /FIXED = age preop\_ps hospital | SSTYPE(3)

 /METHOD = REML

 /PRINT = CORB COVB DESCRIPTIVES SOLUTION TESTCOV

 /RANDOM INTERCEPT | SUBJECT(anes\_id) COVTYPE(UN) .

\*\*M4 & 5: RANDOM SLOPES FOR BOTH LEV 1 PREDICTORS\*\*

MIXED

 qualrec with age preop\_ps hospital

 /CRITERIA = CIN(95) MXITER(100) MXSTEP(5) SCORING(1) SINGULAR(0.000000000001) HCONVERGE(0, ABSOLUTE) LCONVERGE(0, ABSOLUTE)

 PCONVERGE(0.000001, ABSOLUTE)

 /FIXED = age preop\_ps hospital | SSTYPE(3)

 /METHOD = REML

 /PRINT = CORB COVB DESCRIPTIVES SOLUTION TESTCOV

 /RANDOM INTERCEPT age preop\_ps | SUBJECT(anes\_id) COVTYPE(UN).

MIXED

 qualrec with age preop\_ps hospital

 /CRITERIA = CIN(95) MXITER(100) MXSTEP(5) SCORING(1) SINGULAR(0.000000000001) HCONVERGE(0, ABSOLUTE) LCONVERGE(0, ABSOLUTE)

 PCONVERGE(0.000001, ABSOLUTE)

 /FIXED = age preop\_ps hospital | SSTYPE(3)

 /METHOD = REML

 /PRINT = CORB COVB DESCRIPTIVES SOLUTION TESTCOV

 /RANDOM INTERCEPT preop\_ps | SUBJECT(anes\_id) COVTYPE(UN) .

\*\*M6: cross level interaction\*\*

MIXED

 qualrec with age preop\_ps hospital

 /CRITERIA = CIN(95) MXITER(100) MXSTEP(5) SCORING(1) SINGULAR(0.000000000001) HCONVERGE(0, ABSOLUTE) LCONVERGE(0, ABSOLUTE)

 PCONVERGE(0.000001, ABSOLUTE)

 /FIXED = age preop\_ps hospital preop\_ps\*hospital | SSTYPE(3)

 /METHOD = REML

 /PRINT = CORB COVB DESCRIPTIVES SOLUTION TESTCOV

 /RANDOM INTERCEPT preop\_ps | SUBJECT(anes\_id) COVTYPE(UN) .