

## Confidence Intervals for the Number Need to Treat and Relative Risk Indices using Mplus

This document shows you how to obtain confidence intervals in Mplus for the relative risk and number needed to treat indices as indices of effect size. I will illustrate the method using the test of the total effect in a probit-based analysis in a LISEM context for the communication example in Chapter 12. However, the method readily generalizes to other Mplus contexts. I first reproduce the Mplus syntax from Table 12.9 for calculating the total effect:

**Table 12.9: Syntax for Probit Profile Analysis for Total Effect with LISEM**

```

1. TITLE: Probit-based total effect analysis of communication ;
2. DATA: FILE IS c:\mplus\communication.dat ;
3. VARIABLE:
4. NAMES ARE ID COM3 PA2 PK2 PE2 CQ1 PA1 PK1 PE1 TREAT BS1 ;
5. USEVARIABLES ARE COM3 TREAT BS1 CQ1 ;
6. MISSING ARE ALL (-9999) ;
7. CATEGORICAL COM3 ;
8. ANALYSIS:
9. ESTIMATOR = ML ; LINK=PROBIT
10. MODEL:
11. COM3 ON TREAT BS1 CQ1 (p1 b1 b2) ;
12. [COM3$1] (thresh) ;
13. MODEL CONSTRAINT:
14. NEW(CPROBIT TPROBIT CPROB TPROB DIFF) ;
15. CPROBIT = -thresh + p1*0 + b1*.525 + b2*0.012 ;
16. TPROBIT = -thresh + p1*1 + b1*.525 + b2*0.012 ;
17. CPROB = PHI(CPROBIT) ;
18. TPROB = PHI(TPROBIT) ;
19. DIFF = TPROB-CPROB ;
20. OUTPUT: SAMP STANDARDIZED(STDYX) RESIDUAL CINTERVAL TECH4 ;

```

Line 17 calculates the estimated proportion of parents in the control group who communicate with their children and Line 18 calculates the corresponding estimated proportion for the treatment group. Using the formulae in Chapter 10, I modify line 14 to specify the two new parameter names and add two lines, which I number 19a and 19b to the MODEL CONSTRAINT commands to calculate the relative risk (RR) and the number

needed to treat (NNT):

```
13. MODEL CONSTRAINT:
14. NEW(CPROBIT TPROBIT CPROB TPROB DIFF RR NNT) ;
15. CPROBIT = -thresh + p1*0 + b1*.525 + b2*0.012 ;
16. TPROBIT = -thresh + p1*1 + b1*.525 + b2*0.012 ;
17. CPROB = PHI(CPROBIT);
18. TPROB = PHI(TPROBIT) ;
19. DIFF = TPROB-CPROB ;
19a. RR = TPROB/CPROB ;
19b. NNT = 1/(TPROB-CPROB) ;
```

Mplus will generate standard errors and confidence intervals of RR and NNT as part of its standard output. It is likely that the confidence intervals will be asymmetric, so you will want to use bootstrapping or Bayesian methods to accommodate this.