Appendix: Use of other programs

The approach as described can be used with other SEM programs – some, such as Mplus 2.0 [23] have a built in power function, others may not. If the program does not have a built in power function, the method is similar, but must be carried out in two stages. First, fit the model to the hypothesised population data, and find the discrepancy function. If the program does not provide a discrepancy function, it is calculated as $\chi^2/(N - 1)$. The discrepancy function is used as the non-centrality parameter in a non-central χ^2 distribution. This can be evaluated in many statistical programs, including SPSS and SAS.

In SPSS, the following procedure is used (using Example 3, part 1). The χ^2 value of the model fitted to the hypothesised population data is 3.845. To find the discrepancy function, we find $\chi^2 / (N - 1) = 3.854 / 49 = 0.0785$.

We evaluate the power of each sample size separately. To do this, multiply the discrepancy function by N – 1, for a given sample size. The critical value for a χ^2 distribution, can be found in SPSS using IDF.CHISQ(1 – α, df). This is found to be 5.99, and this value is the non-centrality parameter. Finally, we use the non-central χ^2 distribution function NCDF.CHISQ, to find the power, using NCDF.CHISQ(cv, df, ncdf).

The data are shown in Table A.1. The values for χ^2 (chi) and N need to be entered, and the following syntax will create the other variables.

```
COMPUTE disc = chi / 49 .
COMPUTE cv = IDF.CHISQ(0.95, 2) .
COMPUTE ncdf = (n - 1) * disc .
COMPUTE power = 1 - NCDF.chisq(cv,2,ncdf) .
```

Table A.1

chi	N	disc	cv	ncdf	power
3.85	10	.08	5.99	.71	.11
3.85	20	.08	5.99	1.49	.18
3.85	30	.08	5.99	2.28	.25
3.85	50	.08	5.99	3.84	.40
3.85	100	.08	5.99	7.77	.70
3.85	125	.08	5.99	9.73	.80
3.85	150	.08	5.99	11.69	.87
3.85	200	.08	5.99	15.62	.95