6 Steps for Two-Level SEM

Step 0: Do a Type=Basic run to get the cluster information, intraclass correlations, and pooled-within covariance matrix and estimated between correlation matrix.

Input: basic, basicB.

Step 1: Do an approximate exploration of the model using the regular (total) sample covariance matrix.

A. Try the hypothesized model ignoring clustering.
   Input: step1
B. Check the change in SEs and chi-square by using Type = Complex.
   Input: step1Complex
C. Explore the factor structure from scratch using EFA ignoring clustering.
   Input: step1EFA

Step 2: Do the modeling based on the pooled-within covariance matrix to get an approximation of within-level parameter estimates (here applied to the y's)

Input: step2

Step 3: Investigate the size of the intraclass correlations and cluster sizes to see if proceeding to multilevel modeling is warranted. See output from Step0.

Step 4: Explore the between structure using the estimated between matrix from Step0. Do an EFA on the between correlation matrix.

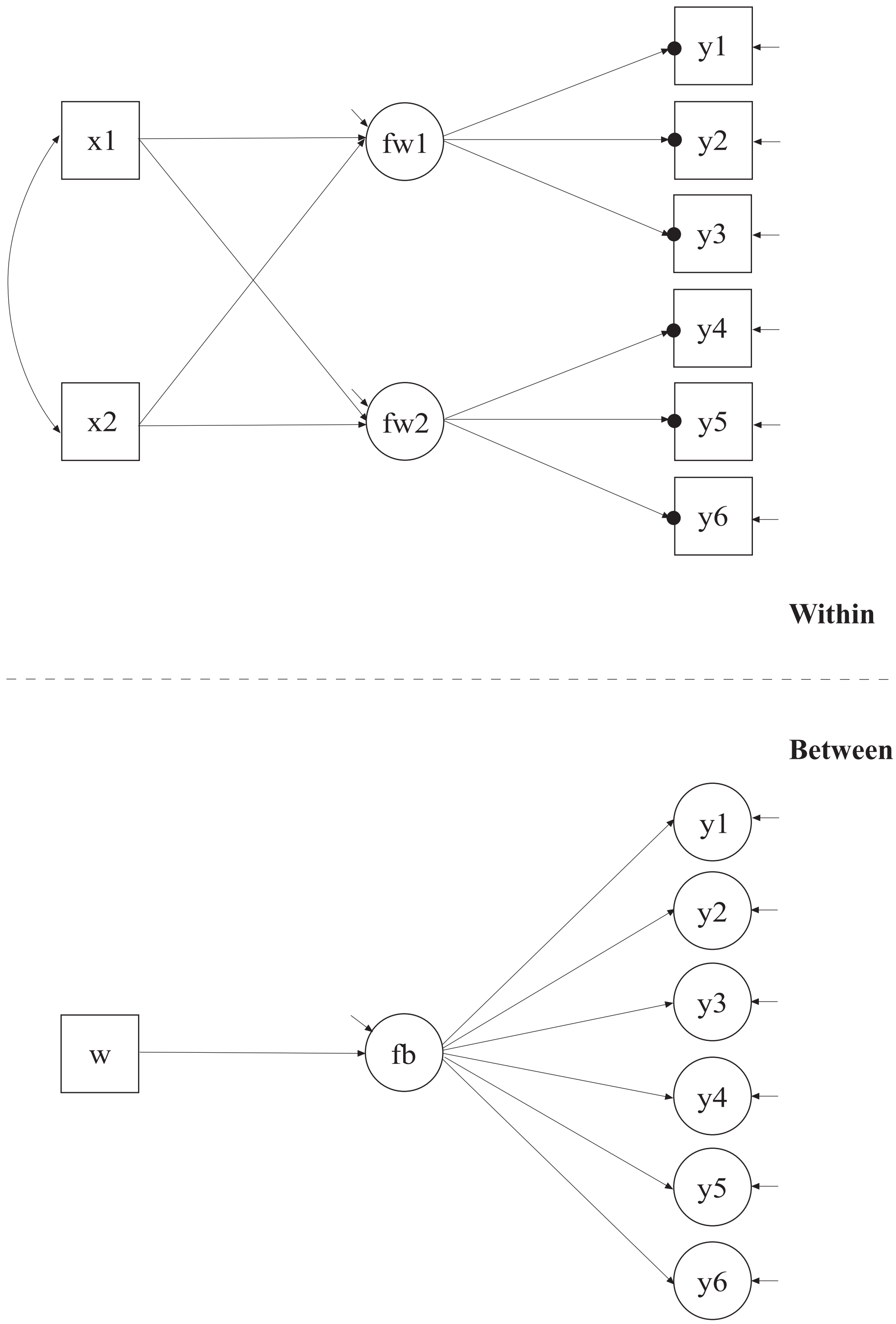
Input: step4

Step 5: Do the full two-level analysis with within and between structures based on steps 2 and 4. This is the model in the User's Guide example 9.8.

Input: step5

EXAMPLE 9.8: TWO-LEVEL CFA WITH CONTINUOUS FACTOR INDICATORS WITH TWO BETWEEN FACTORS AND ONE WITHIN FACTOR

```
TITLE:     this is an example of a two-level CFA with
           continuous factor indicators with two
           factors on the within level and one factor
           on the between level
DATA:      FILE IS ex9.8.dat;
VARIABLE:  NAMES ARE y1-y6 x1 x2 w clus;
           WITHIN = x1 x2;
           BETWEEN = w;
           CLUSTER IS clus;
ANALYSIS:  TYPE IS TWOLEVEL;
           ESTIMATOR = MLR;
MODEL:
           %WITHIN%
           fw1 BY y1-y3;
           fw2 BY y4-y6;
           fw1 ON x1 x2;
           fw2 ON x1 x2;
           %BETWEEN%
           fb BY y1-y6;
           fb ON w;
```


x1
x2
fw1
fw2
y1
y2
y3
y4
y5
y6
Within
Between
w
fb
y1
y2
y3
y4
y5
y6

Basic.inp

```
TITLE:      this is an example of a two-level CFA with
      continuous factor indicators with two
      factors on the within level and one factor
      on the between level

    Basic run: estimate within and between matrices,
               estimate intra class correlations

DATA:       FILE IS ex9.8.dat;
VARIABLE:   NAMES ARE y1-y6 x1 x2 w clus;
    usev = y1-y6;
    CLUSTER IS clus;
ANALYSIS:   TYPE IS TWOLEVEL basic;

Savedata:
    sample = spw.dat;
    sigb = estsigb.dat;
```

---

basicb.inp

```
TITLE:      this is an example of a two-level CFA with
      continuous factor indicators with two
      factors on the within level and one factor
      on the between level

    Basic run: estimate within and between matrices,
               estimate intra class correlations

DATA:       FILE IS ex9.8.dat;
VARIABLE:   NAMES ARE y1-y6 x1 x2 w clus;
    usev = y1-y6;
    CLUSTER IS clus;
ANALYSIS:   TYPE IS TWOLEVEL basic;

Savedata:
 !   sample = spw.dat;
    sigb = estsigb.dat;
    type = corr;
```

step1.inp

```
TITLE:      this is an example of a two-level CFA with
      continuous factor indicators with two
      factors on the within level and one factor
      on the between level

    Step 1A: Ignoring clustering

DATA:       FILE IS ex9.8.dat;
VARIABLE:   NAMES ARE y1-y6 x1 x2 w clus;
      Usev = y1-w;
MODEL:
      f1 BY y1-y3;
      f2 BY y4-y6;
      f1 ON x1 x2 w;
      f2 ON x1 x2 w;

Output:
    standardized sampstat;
```

---

step1complex.inp

```
TITLE:      this is an example of a two-level CFA with
      continuous factor indicators with two
      factors on the within level and one factor
      on the between level

    Step 1B: Ignoring clustering in the modeling,
            but correcting SEs

DATA:       FILE IS ex9.8.dat;
VARIABLE:   NAMES ARE y1-y6 x1 x2 w clus;
      Usev = y1-w;
    cluster = clus;

Analysis:
    type = complex;

MODEL:
      f1 BY y1-y3;
      f2 BY y4-y6;
      f1 ON x1 x2 w;
      f2 ON x1 x2 w;

Output:
    standardized sampstat;
```

step1efa.inp

```
TITLE:      this is an example of a two-level CFA with
      continuous factor indicators with two
      factors on the within level and one factor
      on the between level

    Step 1C: EFA ignoring clustering

DATA:       FILE IS ex9.8.dat;
VARIABLE:   NAMES ARE y1-y6 x1 x2 w clus;
      Usev = y1-y6;

Analysis:
    type = efa 1 3;
    estimator = ml;
```

---

step2.inp

```
TITLE:      this is an example of a two-level CFA with
      continuous factor indicators with two
      factors on the within level and one factor
      on the between level

    Step 2: CFA using the pooled-within matrix

DATA:       FILE = spw.dat;
    type = cova;
    nobs = 890; ! n = N - C
VARIABLE:   NAMES ARE y1-y6;

Model:
    f1 by y1-y3;
    f2 by y4-y6;

Output:
   sampstat standardized;
```

step4.inp

```
 TITLE:     this is an example of a two-level CFA with
      continuous factor indicators with two
      factors on the within level and one factor
      on the between level

    Step 4: EFA using the estimated between
            correlation matrix

DATA:       FILE = estsigb.dat;
    type = corr;
    nobs = 110;
VARIABLE:   NAMES ARE y1-y6;

Analysis:
    type = efa 1 3;
    estimator = ml;

Output:
    sampstat;
```

step5.inp

```
TITLE:      this is an example of a two-level CFA with
      continuous factor indicators with two
      factors on the within level and one factor
      on the between level

    Step 5: full 2-level analysis

DATA:       FILE IS ex9.8.dat;
VARIABLE:   NAMES ARE y1-y6 x1 x2 w clus;
      WITHIN = x1 x2;
            BETWEEN = w;
            CLUSTER IS clus;
ANALYSIS:   TYPE IS TWOLEVEL;
MODEL:
      %WITHIN%
      fw1 BY y1-y3;
      fw2 BY y4-y6;
      fw1 ON x1 x2;
      fw2 ON x1 x2;
      %BETWEEN%
      fb BY y1-y6;
      fb ON w;

Output: sampstat standardized;
```