

Supplemental Materials for

Well-Being and Resources of Minors With Refugee Background in Comparison to Minors With Migration or Native Background

ESM 2

ESM 2.1 Measurement Invariance

Estimating Measurement Invariance across Groups Using Multi-Group CFAs

| Measure | Model | Adaptation | χ^2 | Df | RMSEA | RMSEA 90% CI | | CFI | Scaled χ^2 -test | |
|-------------------------|-------|--|------------|-----|-------|--------------|-------|-----|-----------------------|----------------|
| | | | | | | Lower | Upper | | Comparison | $\Delta\chi^2$ |
| Well-being | 1 | | 2027.36*** | 105 | .19 | .18 | .20 | .81 | | |
| | 1b | All: cov(4, 3); NM, MM: cov(9, 10) | 572.07*** | 100 | .10 | .09 | .10 | .95 | | |
| | 2 | | 565.46*** | 118 | .09 | .08 | .09 | .96 | 2 vs. 1 | 33.94* |
| | 2b | $\lambda(10)$ | 551.74*** | 114 | .09 | .08 | .09 | .96 | 2b vs. 1b | 21.67 |
| | 3 | | 726.67*** | 174 | .08 | .07 | .09 | .94 | 3 vs. 2b | 133.72*** |
| Social Resources | | | | | | | | | | |
| Parental support | 1 | | 182.83*** | 27 | .09 | .08 | .10 | .99 | | |
| | 2 | | 192.49*** | 37 | .11 | .10 | .12 | .99 | 2 vs. 1 | 14.33 |
| | 3 | | 326.41*** | 59 | .09 | .08 | .10 | .99 | 3 vs. 2 | 79.01*** |
| | 3b | $\tau(41 3); \tau(44 1, 2, 3)$ | 228.53*** | 51 | .08 | .07 | .09 | .99 | 3b vs. 2 | 23.07 |
| | 4 | | 313.34*** | 63 | .09 | .08 | .10 | .99 | 4 vs. 3b | 43.11*** |
| Authoritative parenting | 1 | | 252.90*** | 27 | .11 | .10 | .12 | .96 | | |
| | 2 | | 253.73*** | 37 | .13 | .11 | .14 | .95 | 2 vs. 1 | 22.38* |
| | 2b | $\lambda(47)$ | 223.57*** | 35 | .10 | .09 | .12 | .96 | 2b vs. 1 | 10.61 |
| | 3 | | 318.99*** | 57 | .10 | .09 | .11 | .95 | 3 vs. 2b | 56.33*** |

Estimating Measurement Invariance across Groups Using Multi-Group CFAs -- Continued

| Measure | Model | Adaptation | χ^2 | Df | RMSEA | RMSEA 90% CI | | CFI | Scaled χ^2 -test | |
|-----------------------------|-------|--------------------------|-----------|----|-------|--------------|-------|-----|-----------------------|----------------|
| | | | | | | Lower | Upper | | Comparison | $\Delta\chi^2$ |
| Integration into peer group | 1 | | 167.69*** | 27 | .10 | .09 | .12 | .98 | | |
| | 2 | | 158.98*** | 37 | .08 | .07 | .09 | .98 | 2 vs. 1 | 11.71 |
| | 3 | | 209.63*** | 59 | .07 | .06 | .08 | .98 | 3 vs. 2 | 36.99* |
| | 3b | $\tau(51 1); \tau(53 1)$ | 194.20*** | 55 | .07 | .06 | .08 | .98 | 3b vs. 2 | 25.68 |
| | 4 | | 313.74*** | 67 | .09 | .08 | .09 | .96 | 4 vs. 3b | 57.51*** |
| School integration | 1 | | 230.86*** | 27 | .12 | .11 | .14 | .99 | | |
| | 2 | | 212.58*** | 37 | .10 | .08 | .11 | .99 | 2 vs. 1 | 12.75 |
| | 3 | | 266.65*** | 59 | .08 | .07 | .09 | .99 | 3 vs. 2 | 40.61** |
| | 3b | $\tau(57 1, 2, 3)$ | 246.03*** | 53 | .08 | .07 | .10 | .99 | 3b vs. 2 | 25.01 |
| | 4 | | 318.07*** | 65 | .09 | .08 | .10 | .99 | 4 vs. 3b | 41.67*** |
| Personal Resources | | | | | | | | | | |
| Optimism | 1 | | 133.77*** | 27 | .09 | .07 | .10 | .99 | | |
| | 2 | | 151.83*** | 37 | .08 | .07 | .09 | .99 | 2 vs. 1 | 18.38* |
| | 2b | $\lambda(2)$ | 145.43*** | 35 | .08 | .07 | .09 | .99 | 2b vs. 1 | 14.10 |
| | 3 | | 178.65*** | 53 | .07 | .06 | .08 | .98 | 3 vs. 2b | 25.77 |
| | 4 | | 327.83*** | 65 | .09 | .08 | .10 | .97 | 4 vs. 3 | 70.06*** |
| Self-efficacy | 1 | | 491.84*** | 27 | .18 | .17 | .20 | .97 | | |
| | 2 | | 446.19*** | 37 | .15 | .14 | .16 | .97 | 2 vs. 1 | 10.03 |
| | 3 | | 487.59*** | 59 | .12 | .11 | .13 | .97 | 3 vs. 2 | 32.79 |
| | 4 | | 729.54*** | 71 | .14 | .13 | .14 | .95 | 4 vs. 3 | 119.54*** |

Estimating Measurement Invariance across Groups Using Multi-Group CFAs -- Continued

| Measure | Model | Adaptation | χ^2 | Df | RMSEA | RMSEA 90% CI | | CFI | Scaled χ^2 -test | |
|--------------------|-------|--|-----------|----|-------|--------------|-------|-----|-----------------------|----------------|
| | | | | | | Lower | Upper | | Comparison | $\Delta\chi^2$ |
| Empathy | 1 | | 103.86*** | 25 | .08 | .06 | .09 | .99 | | |
| | 2 | | 114.44*** | 37 | .06 | .05 | .08 | .99 | 2 vs. 1 | 15.54 |
| | 3 | | 187.03*** | 59 | .07 | .06 | .08 | .99 | 3 vs. 2 | 43.89** |
| | 3b | $\tau(16 2)$ | 156.65*** | 57 | .06 | .05 | .07 | .99 | 3b vs. 2 | 30.42 |
| | 4 | | 314.82*** | 69 | .08 | .07 | .09 | .97 | 4 vs. 3b | 78.98*** |
| Sense of coherence | 1 | | 202.82*** | 27 | .11 | .10 | .13 | .97 | | |
| | 2 | | 204.99*** | 37 | .09 | .08 | .11 | .97 | 2 vs. 1 | 16.24 |
| | 3 | | 275.15*** | 59 | .09 | .08 | .10 | .96 | 3 vs. 2 | 44.77** |
| | 3b | $\tau(14 2)$ | 240.10*** | 57 | .08 | .07 | .09 | .96 | 3b vs. 2 | 28.35 |
| | 4 | | 335.21*** | 69 | .09 | .08 | .10 | .95 | 4 vs. 3b | 52.68*** |
| Self-esteem | 1 | | 519.42*** | 27 | .19 | .18 | .20 | .97 | | |
| | 2 | | 453.65*** | 37 | .15 | .14 | .16 | .97 | 2 vs. 1 | 25.00** |
| | 2b | $\lambda(17)$ | 463.76*** | 35 | .16 | .14 | .17 | .97 | 2b vs. 1 | 10.87 |
| | 3 | | 455.39*** | 57 | .12 | .11 | .13 | .98 | 3 vs. 2b | 26.16 |
| | 4 | | 567.58*** | 69 | .12 | .11 | .13 | .97 | 4 vs. 2 | 61.91*** |
| Self-control | 1 | | 177.69*** | 27 | .11 | .09 | .12 | .95 | | |
| | 2 | | 176.31*** | 37 | .09 | .07 | .10 | .95 | 2 vs. 1 | 15.65 |
| | 3 | | 279.66*** | 59 | .09 | .08 | .10 | .93 | 3 vs. 2 | 59.60*** |
| | 3b | $\tau(19 2, 3);$ $\tau(30 3); \tau(36 2)$ | 206.74*** | 51 | .08 | .07 | .09 | .95 | 3b vs. 2 | 22.19 |
| | 4 | | 237.18*** | 63 | .07 | .06 | .08 | .94 | 4 vs. 3b | 22.28* |

Estimating Measurement Invariance across Groups Using Multi-Group CFAs -- Continued

| Measure | Model | Adaptation | χ^2 | Df | RMSEA | RMSEA 90% CI | | CFI | Scaled χ^2 -test | |
|-----------------------|-------|---------------------|-----------|----|-------|--------------|-------|------|-----------------------|----------------|
| | | | | | | Lower | Upper | | Comparison | $\Delta\chi^2$ |
| Religion | | | | | | | | | | |
| Religious identity | 1 | | 32.96*** | 6 | .09 | .06 | .13 | >.99 | | |
| | 2 | | 32.76** | 12 | .06 | .03 | .08 | >.99 | 2 vs. 1 | 6.97 |
| | 3 | | 107.88*** | 34 | .06 | .05 | .08 | >.99 | 3 vs. 2 | 46.32** |
| | 3b | $\tau(3, 4 2, 3)$ | 67.26*** | 26 | .06 | .04 | .07 | >.99 | 3b vs. 2 | 23.56 |
| | 4 | | 226.19*** | 34 | .10 | .09 | .12 | >.99 | 4 vs. 3b | 54.17*** |

Note. Estimation was done using the DWLS estimator. χ^2 -values, RMSEA and its confidence interval (CI) values, and CFI-values are robust. Note that the scaled- χ^2 -test is based on the standard χ^2 -values. Groups are native minors (NM, $n = 858$, reference group), refugee minors (RM, $n = 209$), and immigrant minors (MM, $n = 535$).

Model 1 = configural, Model 2 = metric invariance model, Model 3 = scalar invariance model, Model 4 = strict invariance model. b-Models are adapted to allow for partial invariance: cov(a, b) relates to the covariance between item a and b; $\lambda(a)$ relates to the loadings of item a; $\tau(a | b, a)$ relates to thresholds b and c of item a.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Measurement Invariance Analyses and Results

Measurement invariance across groups for each scale or subscale was assessed using multigroup confirmatory factor analyses (MG-CFA), following steps and recommendations outlined in Kline (2016). The Likert-scaled items were treated as ordinal and each scale or subscale was tested separately, setting up CFA models with one latent factor each, estimated using the diagonally weighted least squares (DWLS) estimator in R 4.0.0 (R Core Team, 2020). For religious practice, formal invariance tests were not conducted, since the scale consisted of only two items. For the other scales and subscales, the testing procedure consisted of the following steps (see Table ESM 2.1 for models and results):

- (1) The configural model (model 1) was estimated and evaluated, using the “native minors” group (NM) as the reference group. If overall model fit was not sufficient according to the robust fit indices, residuals were evaluated and an adapted, less restrictive model 1b was fitted to establish the most parsimonious, yet well-fitting model.
- (2) Based on the final configural model, the item loadings were restricted to be equal across groups for the metric invariance model (model 2). The scaled χ^2 -difference test was used to evaluate if metric invariance holds. If model 2 resulted in significantly worse fit, an item loading restriction was released to establish a model with partial metric invariance (model 2b).
- (3) Based on the final (partial) metric invariance model, the item thresholds were restricted across groups to test for scalar invariance (model 3). The scaled χ^2 -difference test was used to evaluate if scalar invariance holds. If in the previous step full metric invariance was established and model 3 provided significantly worse fit, residuals were checked, and a maximum of four item threshold restrictions were released accordingly to find a well-fitting model 3b with partial scalar invariance. If in the previous step, partial metric invariance was established and model 3 provided significantly worse fit, the model was not further adapted, and strict invariance was not tested.
- (4) Based on the final (partial) scalar invariance model, the item variances were restricted across groups to test for strict invariance (model 4). The scaled χ^2 -difference test was used to evaluate if strict invariance holds. If in the previous step,

full scalar invariance was established, residuals were checked to evaluate possible adaptations. However, only the subscale *self-efficacy* resulted in full scalar invariance and partial strict invariance could not be established without a considerable amount of model adaptations. For all other scales or subscales, adaptations had been necessary in previous steps, and the strict invariance model showed significantly worse fit. Therefore, (partial) strict invariance was not established for any scale or subscale.

In summary, results of the MGCFA analyses show the following results:

Well-being (KIDSCREEN-10): The initial configural model (CFI = .81, RMSEA = .19) was adapted to allow for covariances between items 3 and 4 to vary across groups, and covariances between items 9 and 10 to vary for native minors and minors with migration background. Subsequently, partial metric invariance was established by allowing the loadings of item 10 to vary across groups, $\Delta\chi^2_{(14)} = 21.67$ *n.s.*, CFI = .96, RMSEA = .09.

Parental support: Partial scalar invariance was established by allowing the first, second, and third threshold of item 44 and the third threshold of item 41 to vary across groups, $\Delta\chi^2_{(14)} = 23.07$ *n.s.*, CFI = .99, RMSEA = .08.

Authoritative parenting: Partial metric invariance was established by allowing the loadings of item 47 to vary across groups, $\Delta\chi^2_{(8)} = 10.61$ *n.s.*, CFI = .96, RMSEA = .10.

Integration into peer group: Partial scalar invariance was established by allowing the first thresholds of items 51 and 53 to vary across groups, $\Delta\chi^2_{(18)} = 25.68$ *n.s.*, CFI = .98, RMSEA = .07.

School integration: Partial scalar invariance was established by allowing the first, second, and third threshold of item 57 to vary across groups, $\Delta\chi^2_{(16)} = 25.01$ *n.s.*, CFI = .99, RMSEA = .08.

Optimism: Partial scalar invariance was established by allowing the loadings of item 2 to vary across groups, $\Delta\chi^2_{(18)} = 25.77$ *n.s.*, CFI = .98, RMSEA = .07.

Self-efficacy: Full scalar invariance was established. However, the high RMSEA value indicates that a less restrictive model might be more appropriate, $\Delta\chi^2_{(22)} = 32.79$ *n.s.*, CFI = .97, RMSEA = .12.

Empathy: Partial scalar invariance was established by allowing the second threshold of item 16 to vary across groups, $\Delta\chi^2_{(20)} = 30.42$ *n.s.*, CFI = .99, RMSEA = .06. However, fit indices of the strict invariance model indicate that a more restricted model might be supported, CFI = .97, RMSEA = .08.

Sense of coherence: Partial scalar invariance was established by allowing the second threshold of item 14 to vary across groups, $\Delta\chi^2_{(20)} = 28.35$ *n.s.*, CFI = .96, RMSEA = .08.

Self-esteem: Partial scalar invariance was established by allowing the loadings of item 17 to vary across groups. However, the high RMSEA value indicated that a less restrictive model might be more appropriate, $\Delta\chi^2_{(22)} = 26.16$ *n.s.*, CFI = .98, RMSEA = .12.

Self-control: Partial scalar invariance was established by allowing the second and third thresholds of item 19, the third threshold of item 30, and the second threshold of item 36 to vary across groups, $\Delta\chi^2_{(14)} = 22.19$ *n.s.*, CFI = .95, RMSEA = .08.

Religious identity: Partial scalar invariance was established by allowing the second and third threshold of items 3 and 4 to vary across groups, indicating that the extent of religious identity in a participant in order to answer “3 neither” instead of “2 rather not” and “4 rather yes” instead of “3 neither” is different for the groups, $\Delta\chi^2_{(14)} = 23.56$ *n.s.*, CFI > .99, RMSEA = .06.

References

Kline, R. B. (2016). *Principles and practice of structural equation modeling*. Guilford publications.

R Core Team (2020). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. <https://www.R-project.org/>