

BFLPE_Model

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Purpose

This document is to document models for a big-fish-pond effect (**BFLPE**).

Model 1: Random-Intercept Model (Figure 1)

The individual level (Level 1): individual reading performance to predict individual self-concept. The class level (Level 2): individual the average of reading performance to predict self-concept.

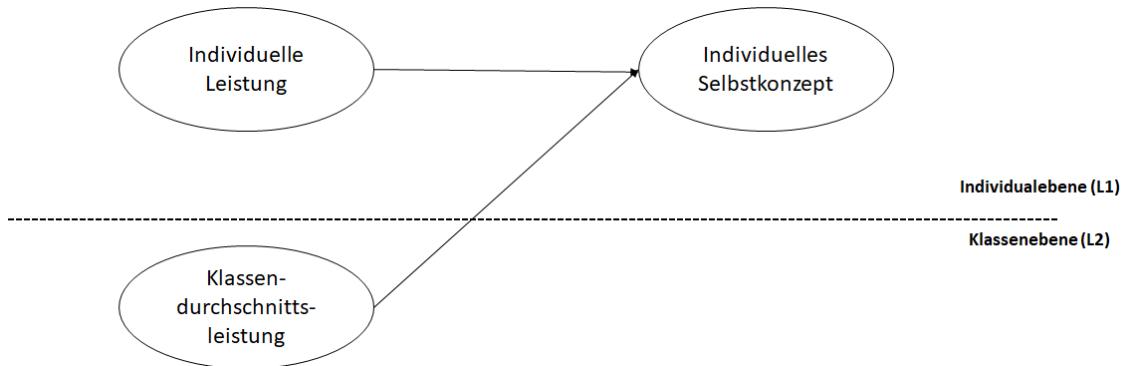


Figure 1: Reading performance to self concept

Model 1 can be expressed mathematically:

- i represents an individual, j represents a class, $IndSk_{ij}$ is individual self-concept, $IndLeis_{ij}$ is individual reading performance, $KLeis_j$ is the average of reading performance in class. γ_{ij} is a random effect at the individual level.
- β_{0j} is a random effect and each school has own intercept. γ_{00} is a grand mean. v_{0j} is a random effect at the class level.
- β_{1j} is a slope for the predictor of $IndSk_{ij}$. It is a fixed effect and there is only one slope across classes.

Individual level (L1)

$$IndSk_{ij} = \beta_{0j} + \beta_{1j} * IndLeis_{ij} + \gamma_{ij}, \gamma_{ij} \sim \text{Norm}(0, \sigma_\gamma^2)$$

Class level (L2)

$$\beta_{0j} = \gamma_{00} + \gamma_{01} * KLeis_j + v_{0j}, v_{0j} \sim \text{Norm}(0, \sigma_\gamma^2)$$

$$\beta_{1j} = \gamma_{10}$$

Model1 Mplus code:

```
USEVAR = dPolSk_r dPolLeis; MISSING = all(-9999);
CLUSTER = klasid;
```

```
ANALYSIS: TYPE = TWOLEVEL;
```

```
DEFINE: center (groupmean);
```

```
MODEL:
```

```
%WITHIN%
```

```
dPolSk_r ON dPolLeis(b_within);
```

```
%BETWEEN%
```

```
dPolSk_r ON dPolLeis (b_between);#Mplus automatically
```

```
MODEL CONSTRAINT: !Define and estimate the composition effect new(context); context = b_between - b_within;
```

Note. Mplus automatically calculated the average of reading performance for each class because you did not make a claim in the USEVAR.

Mplus output:

MODEL RESULTS

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
Within Level				
DPOLSK_R ON DPOLLEIS	0.787	0.110	7.136	0.000
Residual Variances				
DPOLSK_R	0.487	0.016	30.039	0.000
Between Level				
DPOLSK_R ON DPOLLEIS	0.624	0.152	4.095	0.000
Intercepts DPOLSK_R	2.003	0.111	18.036	0.000
Residual Variances				
DPOLSK_R	0.008	0.006	1.293	0.196
New/Additional Parameters				
CONTEXT	-0.163	0.199	-0.819	0.413

Figure 2: Model Result from Mplus