Revisiting the factor structure of the French WISC-IV: Insights through Bayesian structural equation modeling (BSEM)

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Revisiting the factor structure of the French WISC-IV: Insights through Bayesian structural equation modeling (BSEM)*

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INTRODUCTION

- The Wechsler Intelligence Scale for children, 4th edition (WISC-IV) remains the most widely used test in the field of intelligence assessment.
- The interpretation of the WISC-IV is based on a 4-factor model which is only partially compatible with the mainstream Cattell-Horn-Carroll (CHC) model of intelligence measurement. Several confirmatory factor analytic studies (CFA) have shown that CHC-based models were more adequate than the 4-factors model.
- Some controversy also remains on the exact nature of constructs measured by each subtest (e.g. what does Arithmetic measure?).

SAMPLE DESCRIPTION

- 249 children from 8 to 12yr - schools from Geneva.

French-speaking Swiss children

<table>
<thead>
<tr>
<th>N</th>
<th>Mean Age (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>124</td>
</tr>
<tr>
<td>Girls</td>
<td>125</td>
</tr>
</tbody>
</table>

Total sample: 249

0.73 (1.19)

The posterior distribution of Bayesian estimation was achieved through Markov Chain Monte Carlo (MCMC) algorithm with the Gibbs sampler Method.

RESULTS – MODELS COMPARISONS

- The 10 core and the 5 supplemental subtests were administered.

RESULTS – CHC 5 FACTOR MODEL WITH CROSS-LOADINGS

- The first goal of this study was to compare CHC-based models to the classical 4-factors structure on the French WISC-IV.
- The second goal was to address the limitations of traditional maximum likelihood CFA using Bayesian structural equation modeling (BSEM).

GOALS OF THE PRESENT STUDY AND METHODOLOGY

- The first goal of this study was to compare CHC-based models to the classical 4-factors structure on the French WISC-IV.
- The second goal was to address the limitations of traditional maximum likelihood CFA using Bayesian structural equation modeling (BSEM).

CONCLUSIONS

1. Results on a sample of 249 French-speaking Swiss children (8-12 yr) showed that the CHC-based model fit was better than the 4-factor solution.
2. Models including small cross-loadings were more adequate.
3. Because every parameters were estimated, we got better insight on the nature of constructs measured by each subtest. Additionally, no further modifications needed to be tested. Thus, the BSEM model may have greater generalizability than extensively modified CFA models.
4. Because with ill-specified CFA models the correlations of first-order factors tend to be positively biased, the second order loadings are often overestimated (e.g. the loading of Gf on g is often found to be unitary). It was not the case with the BSEM model.