1. BACKGROUND

Working memory (WM) – the ability to store and manipulate information in the course of ongoing cognitive activities - has been suggested to play a key role in supporting learning in many different domains (Pickering, 2006). This study presents the findings of a 3-wave, latent variable longitudinal study, exploring variations and the development of two working memory components - verbal short-term storage and the central executive - in young children, their distinctiveness from related cognitive abilities, and their contributions to learning in the key domains of language, literacy, and mathematics.

2. METHOD

Three-factor CFA models for the different study waves Stability of the WM constructs

<table>
<thead>
<tr>
<th>WM measures</th>
<th>Stability of individual differences in young children's WM abilities</th>
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<tr>
<td>WM system with separate but related elements corresponding to verbal short-term storage and a central executive</td>
<td>good discriminant and convergent validity</td>
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3. RESULTS I: Structure of working memory in young multilingual children

Summary of the HRM with short-term storage and the central executive in kindergarten predicting the different learning domains one and two years later. Links represent specific contributions of either short-term storage or the central executive to learning (i.e., controlling for the variance shared with the central executive or short-term storage, respectively). The central executive predicted subsequent comprehension and mathematical skills when short-term storage was controlled. After entering additional covariate these links remained significant even after the autoregressive effect was taken into account.

4. RESULTS II: Links between working memory and learning

Verbal short-term storage significantly predicted vocabulary one year and two years later. Highly specific links were further observed between the central executive and reading in first grade and spelling in second grade. These links remained significant even after the autoregressive effect was taken into account.

5. CONCLUSION

Results indicate that relations between the measures were best characterized by a model consisting of two related but separable constructs - corresponding to short-term storage and a central executive attentional control system - that were highly stable across the years. Whereas verbal short-term memory was more specifically linked to early vocabulary development, the central executive appeared to support learning in a wide range of domains, including language comprehension, literacy, and mathematics. The findings reinforce previous evidence indicating that verbal short-term memory is one of the main contributors to vocabulary development by supporting the formation of stable phonological representations of new words in long-term memory. Furthermore, the findings fit well with the position that the central executive makes general rather than specific contributions to learning - possibly in terms of an attentional control system that actively maintains crucial information and regulates controlling processes during complex cognitive activities. In conclusion, the findings indicate that different components of the WM system can be reliably assessed in children as young as 5, that individual differences in these abilities are highly stable over time, and that WM assessments are predictive of future learning in key academic domains. This reinforces the value of early screening of working memory abilities to identify children who are at a present and future educational risk.