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An Examination of Clinical Measurements of Verbal Working Memory

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Introduction: Working Memory

- Working memory is the ability to briefly store information in memory while, at the same time, using that information during cognitive processing (e.g., Baddeley, 1999).
- Working memory is part of a larger set of skills called executive functions which are related to planning and executing goal-directed behavior.
- Children with language disorders have been shown to have limitations in verbal (phonological) working memory (e.g., Alloway, Rajbhandar, & Archibald, 2006; Alloway, Kirkwood, Elliott, Holmes, & Bouma, 2008).

Verbal working memory deficits have been implicated in deficits in vocabulary development, language comprehension, language learning, narrative writing, phonological processing, decoding, reading comprehension, curriculum learning, reasoning, problem solving, and even social interaction and behavioral control (Snow & Catalaanta, 2001). Gathercole, Alloway, Kirkwood, Elliott, Holmes, & Bouma (2008) found that these impairments were strongly related to other scores in the areas of language, social skills, problem behaviors, and executive control.

Despite the importance of working memory in language development, there is limited evidence for the validity of many working memory test batteries used (e.g., Gathercole, 2004).

We aimed to explore the relationships among these working memory measures with other measures of language, social skills, and problem behaviors.

Working Memory Assessment

- Psychologists typically assess working memory and other cognitive skills using, for example, portions of the WISC-IV, the WRAML2, the WAIS-III, the D-KEFS, the WMS-R, the BADS-C, the NEPSY, Working Memory Test Battery for Children, and the BRIEF.
- More available to SLPs are some measures of working memory that are integrated into comprehensive tests of language (e.g., CELF-4) or phonological awareness (e.g., CTOPP).
- Through reviewing records of school age children and adolescents (N=50), mean age 10 yr., who had been referred to our university clinic for “language and auditory processing assessment,” we analyzed different measures related to working memory.

NOTE: One sample t-tests showed that this group of subjects differed significantly (p<.05) from the norm on the measures of working memory, working memory, and overall executive function (BRIEF composite score).

Are Our Working Memory Measures Related?

- All of the t-tests showed that this group of subjects differed significantly (p<.05) from the norm on the measures of working memory, working memory, and overall executive function (BRIEF composite score).
- Significant correlations were found between:
  - Teacher BRIEF Working Memory
  - Parent BRIEF Working Memory
  - Parent Brief Working Memory and
  - CELF IV Working Memory Index

- In general, the relationships among these variables are not strong, as would be expected if they were accurately measuring the same construct or highly related constructs.

Are Our Working Memory Measures Related to Measures of Language, Executive Dysfunction, Social Skills, and Behavior?

- An additional correlation matrix was generated to determine the degree of relationship between the 4 working memory variables, and other clinical measures from the same group of subjects. These other variables included the composite scores from:
  - CELF-4
  - Receptive Language
  - Expressive Language
  - Language Content
  - Social Skills Rating System (SSRS)
  - Social Skills
  - Problem Behaviors
  - BRIEF Global Executive (Disfunction) Composite
  - Teacher form
  - Parent form

- Each working memory assessment was correlated with a different set of tests measuring language, executive impairment, social skills, or problem behaviors, indicating that each is unique. The uniqueness of these tests is supported by the fact that they are not highly correlated with each other.

- SLPs should be aware that not all working memory tests at our disposal are measuring the same thing.

- The validity and predictive value of our working memory measures should be explored further. The relationships among our working memory tests and those typically used by psychologists should also be investigated.