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Using the Cognitive Proficiency Index in Psychoeducational Assessment

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Introduction

The Cognitive Proficiency Index (CPI) summarizes performance on the WISC–IV working memory and processing speed indices in a single score. The CPI represents a set of functions whose common element is the proficiency with which a person processes certain types of cognitive information. Proficient processing—through quick visual speed and good mental control—facilitates fluid reasoning and the acquisition of new material by reducing the cognitive demands of novel or higher order tasks. This efficiency in cognitive processing facilitates learning and problem solving by "freeing up" cognitive resources for acquiring more advanced skills (Weiss, Saklofske, Prifitera, & Holdnack, 2006). The CPI is particularly important to clinicians as they evaluate the learning needs of school-aged youngsters.

The Individuals with Disabilities Education Improvement Act (IDEA, 2004) defines specific learning disabilities as:

> ***300.8(10)*** *Specific learning disability. (i) General. Specific learning disability means a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, that may manifest itself in the imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations, including conditions such as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. (ii) Disorders not included. Specific learning disability does not include learning problems that are primarily the result of visual, hearing, or motor disabilities, of mental retardation, of emotional disturbance, or of environmental, cultural, or economic disadvantage.*

The passage of IDEA 2004 specified several methods that could be used to identify students as having a learning disability. One of these methods is to identify a pattern of a student's cognitive strengths and weaknesses. To stimulate discussion and reinforce best practice in the field, this Technical Report is a summary of research conducted to determine the impact of cognitive proficiency as it relates to the areas of reading and written expression.

Description of Study

To investigate the utility of the CPI in the context of psychoeducational assessment of strengths and weaknesses, we evaluated both clinical and nonclinical groups by three methods during the WISC–IV standardization project:

1. Achievement < General Abilities Index (GAI)
2. CPI < GAI
3. Both Achievement and CPI < GAI

We considered GAI an appropriate estimate of ability for this purpose because the WMI and PSI are implicated in various learning disabilities, potentially reducing the discrepancy and making eligibility less likely for some students. We defined a large discrepancy as 15 or more points, and we considered only discrepancies in the hypothesized direction (i.e., achievement < GAI, and CPI < GAI).

With method 1 we examined the percentage of subjects in the nonclinical sample with Achievement < GAI. Of the 516 nonclinical subjects who were administered the WISC–IV and WIAT–II, 21% had a large difference between ability and achievement, but no difference between GAI and CPI. Clearly, this percentage is much higher than the base rate of learning disabilities among the general population. There are many

reasons why a child may present lower achievement than expected based on her or his capability. Possible reasons include inadequate classroom instruction, linguistic diversity, low motivation, home environment not conducive to studying, poor physical health, unsafe learning environment, executive function disorders, affective interference due to familial distress, emotional disorders, post traumatic stress disorder, etc. Given this plethora of etiologies and the high base rate, the presence of an achievement < GAI discrepancy alone cannot be used as a diagnostic marker of a learning disability.

Using method 2, we examined the percentage of subjects with CPI < GAI who showed no evidence of an achievement-ability discrepancy (AAD). Nine (9) percent of nonclinical subjects met this criterion. We then used method 2 to examine specific clinical groups as compared to matched controls.

For each of the 12 clinical groups tested as part of the WISC–IV standardization project, we identified a sample of nonclinical subjects matched on all relevant demographics, and examined the sensitivity (true positive rate) and specificity (true negative rate) for classifying these conditions at various cut scores of CPI < GAI. We selected 60% as the minimum acceptable rate for both sensitivity and specificity. Acceptable results were obtained for four clinical groups:

- Students receiving special education services for learning disabilities in reading and writing were identified with a sensitivity of 66% and specificity of 63% when CPI was 5 or more points lower then GAI.
- Subjects with closed head, traumatic brain injuries were identified with a sensitivity of 65% and specificity of 61% when CPI was 4 or more points lower than GAI.
- Subjects with open head, traumatic brain injuries were identified with a sensitivity of 67% and specificity of 62% when CPI was 4 or more points lower then GAI.
- Subjects with Asperger's were identified with a sensitivity of 68% and specificity of 63% when CPI was 11 or more points lower then GAI.

Given these findings, it is clear that CPI < GAI discrepancies alone cannot be considered a diagnostic marker of any specific learning or clinical disorder, but are implicated in a variety of disorders and conditions.

Using method 3, we examined the prevalence of large differences between Achievement < GAI and CPI < GAI. Only 2% of normal children obtained a large CPI < GAI difference in combination with a large Achievement < GAI difference. We then examined the frequency of these dual criteria in the reading disorder, writing disorder, and combined reading and writing disorder samples reported in the WISC–IV Technical and Interpretive Manual. The percentage of subjects receiving LD services who met both criteria ranged from 45–50% in the various reading and writing disorder samples. This suggests that the combined criteria may hold promise in the identification of children with learning disabilities in reading and writing.

Because these students with LD were originally identified solely on the presence of an AAD, many may have been underachieving for reasons other than a learning disability as previously noted. Using multiple eligibility criteria that includes CPI will reduce the percentage of students who qualify for services and do not have a processing deficit, but are struggling in school for other reasons.

Results of this study are consistent with recent research that supports the practice of looking beyond FSIQ for a pattern of cognitive strengths and weaknesses among the four WISC–IV Index scores in psychoeducational evaluations. Konold (1999) found that when the four index scores were entered simultaneously into a regression equation predicting academic achievement, the resulting variance was larger than that for FSIQ in all academic areas examined. Using WISC–III, he found that the variance accounted for by the four index scores was 61% for reading, 65% for math, and 48% for writing. Similarly, Mayes and Calhoun (2007) showed that when all four WISC–IV index scores were entered simultaneously into a regression equation for predicting academic achievement, the resulting variance explained was 68% for basic reading, 70% for reading comprehension, 77% for numerical operations, and 58% for written expression. Our results are consistent with these studies in the areas of reading and writing. Our data in combination with these two studies provide strong empirical support for an approach to determining LD that involves a pattern of cognitive strengths and weaknesses among the WISC–IV index scores and achievement.

Any contemporary discussion of special education eligibility criteria would be incomplete without consideration of response to intervention (RTI) approaches. As with both AAD and cognitive processing approaches, there are many possible reasons why a student may fail to respond to appropriate empirically supported interventions in the regular classroom environment. As this study reinforces, no singular criteria is scientifically defensible. Determination of eligibility for special education services for a student with learning disabilities is best informed by a combination of results

from three methods, including a) evidence of failure to respond to standard educational interventions, b) lack of achievement in accordance with curriculum demands, and c) presence of a deficiency in one or more of the basic psychological processes. Though CPI is a quick sample of multiple processing functions, it does not tap all neurocognitive processes. Consequently, additional measures may sometimes be necessary to reveal a processing deficit that may be influencing a student's failure to respond to educational interventions when a pattern of specific neurocognitive strengths and weaknesses is not immediately evident using the CPI.

For those students who meet the CPI < GAI criteria, however, curriculum-based instruction cannot repair a brain-based deficiency in how information is processed. For younger students, psychologists should collaborate with educators to devise methods of adjusting teaching strategies to accommodate these unique learning styles in the classroom. For older students, psychologists and educators can devise and directly teach compensatory strategies that students can use on a lifelong basis. For further information about the use of CPI in the context of LD evaluations, see Weiss, Saklofske, Prifitera, & Holdnack (2006; pp. 169–179).

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ISBN 999872435-X