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Research Brief

Differential Cognitive Processing Performance of Children with ADHD and Learning Disabilities

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Introduction

Attention-Deficit-Hyperactivity Disorder (ADHD) disorder and Learning Disabilities (LD) are two of the most common childhood disorders. Indeed, ADHD is the most researched childhood disorder (Barkley, 1990) and LD is the most common special education diagnostic category. Although children with these two disorders are easily distinguishable from children without neurological deficits, these two disorders have a high comorbidity rate, as well as similar psychoeducational and behavioral profiles (Cantwell & Baker, 2001). Such similarities between the two disorders can result in either a pattern of underdiagnosis or overdiagnosis depending upon the diagnostic tools used. Additionally since the two disorders are often highly associated with one another, it is often postulated that treating the primary of the two disorders will lead to improvement in the other disorder.

According to Cantwell and Baker (2001), some clinicians have erroneously concluded that ADHD leads to LD or LD leads to ADHD without a thorough evaluation of the underlying organic, cognitive, or environmental factors of these two disorders. Therefore, a starting point to understanding the underlying processes of these two disorders is to evaluate their cognitive processes from a theoretical orientation.

The purpose of the current study was to investigate and differentiate cognitive processing differences in children with ADHD and LD according to the Cattell-Horn-Carroll (CHC, i.e., Carroll, 1993) cognitive processing theory and the Gf-Gc (i.e., Cattell, 1941, & Horn, 1965) cognitive processing theory.

The authors hypothesized that clear cognitive differences would emerge between the two samples, since it is likely that children with ADHD and LD have differing neurological bases, to which the CHC and Gf-Gc theory should be sensitive.

Methodology

The current study examined 563 children (mean age = 11.6 years, standard deviation = 3.3) who had been referred for a neuropsychological assessment and had been given either a diagnosis of ADHD or LD. The sample consisted of 369 children with a diagnosis of ADHD and 194 children with a diagnosis of LD. Each participant received, as part of a comprehensive battery, 14 cognitive subtests that were selected from the Woodcock-Johnson Psycho-Educational Battery-Revised (WJ-R, Woodcock & Johnson, 1989).

MANOVA of Cognitive Processing Performance of Children with ADHD and LD

Subtest	ADHD-Mean	LD-Mean	F	p
Memory for Names	93.41*	89.08	14.352	.000
Memory for Sentences	102.13*	93.88	26.447	.000
Visual Matching	89.46*	86.85	3.928	.048
Incomplete Words	90.98	92.34	1.255	.263
Visual Closure	102.98*	99.86	5.650	.018
Picture Vocabulary	99.40*	92.06	31.284	.000
Analysis-Synthesis	99.25*	93.30	18.194	.000
Visual-Auditory Learning	95.40*	90.10	14.514	.000
Memory for Words	97.56*	92.07	15.275	.000
Cross Out	93.83*	90.81	4.534	.034
Sound Blending	98.36*	95.56	4.517	.034
Picture Recognition	102.28*	97.26	9.834	.002
Oral Vocabulary	98.21*	89.02	35.782	.000
Concept Formation	97.20*	89.20	38.575	.000

Composite	ADHD-Mean	LD-Mean	F	p
Long Term Retrieval	94.07*	89.02	18.830	.000
Short Term Memory	99.65*	92.09	24.864	.000
Processing Speed	89.82*	87.04	3.994	.046
Auditory Processing	94.44	93.28	.987	.321
Visual Processing	102.35*	97.53	12.275	.000
Verbal Comprehension	98.19*	89.74	37.966	.000
Fluid Reasoning	97.44*	89.65	35.690	.000
Broad Cognitive Ability	94.28*	85.97	37.380	.000

* Indicates statistical significance

Results and Summary

The Results of a Multivariate Analysis of Variance (MANOVA) indicated that cognitive differences on subtests did indeed exist between the two groups, Wilks' Lambda = .852, $F(24, 538) = 3.890$, $p = .000$.

Overall, the group with ADHD performed at a higher level than did the group with LD in regard to cognitive processing. Indeed, the group with ADHD did significantly better on thirteen subtests and nine indexes, such as Long Term Retrieval (Glr), Short-term Memory (Gsm), Processing Speed (Gs), Visual Processing (Gv), Verbal Comprehension-Knowledge (Gc), and Fluid Reasoning (Gf). However, the group with LD had higher scores (but not significantly) than the ADHD group with respect to the subtest Incomplete Words. Wu, Anderson, and Castiello (2002) demonstrated that individuals with ADHD have slower verbal responses, which may explain why the Auditory Processing Composite was higher for the group with LD.

It is likely that children with ADHD have less diffuse cognitive impairment than do children with LD. This has implications for the primary and secondary differential diagnosis of children with comorbid LD and ADHD.

Future research should continue to explore these processing difficulties. Such research might explore profile analysis implications, as well as implications for academic and vocational settings. Additionally, future research may need to be conducted utilizing the various types of LD, as well as the subtypes of ADHD.

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