

**The Clinical Utility of the Cognitive Assessment System (CAS)
in a Child and Adolescent Psychiatric Inpatient Population**

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**A Doctoral Project Submitted in Partial Fulfillment of
The Requirements of the Degree of Doctor of Psychology
In the Department of Psychology at Pace University**

New York

2004

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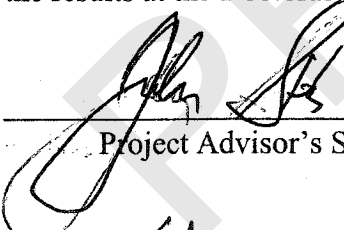
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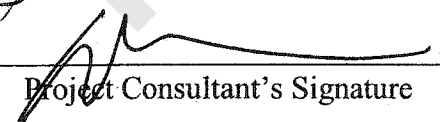
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Acknowledgments

I would like to thank my parents for all of their love and support which has allowed me to reach this amazing goal. I am grateful to my father, Joseph Ryan for leaving footprints to follow on my way to becoming the second Dr. Ryan. And to my mother, Helen, I am grateful for her presence as a role model of courage, perseverance, and strength of mind. Although my many years of training have equipped me to enter the profession of psychology, it is the core values and strength of character instilled in me by my parents which has truly prepared me to become a psychologist.

This project would not have been possible without the guidance and support of Dr. John Stokes. His patience and encouragement in the early stages of my indecisiveness and writer's block allowed me to push forward. His vast knowledge of the complex relationship between cognitive processes and psychopathology has guided this project as well as my ongoing clinical experience. In addition, I would like to thank Dr. David Pogge for his guiding hand in this project. I value his thoughtful logic and insights as well as his sense of humor.

There are many other people in my life to whom I am grateful for their love, laughter, and support. My brothers, Bob and Dan, who are always there to act as protective big brothers, and Jen, who has become the ideal big sister. To my new nephew Jake, who has put this project and life in perspective and for helping me to procrastinate on the last draft of this project. I would also like to thank Richie, my stepfather, for all his understanding and support

throughout the years. And last but not least, my friends, who have been there to encourage me, listen to my grumbling, cajole me into needed spontaneous adventures, subsidize my student income, and provide me with much needed comic relief.

PREVIEW

ABSTRACT

This study examined 926 child and adolescent cases from an inpatient psychiatric setting in order to assess the clinical utility of the Cognitive Assessment System (CAS). Scores from the four CAS PASS index scores were classified according to a cluster analysis and a rule based method. Both methods suggested that the data was characterized mainly by level effects as opposed to patterns of strengths and weaknesses. For the five weakness groups analyzed, which included four groups with individual PASS weaknesses and a combined Planning/Attention weakness group, significant relationships between WISC-III factor scores, CPT visual omission scores, and WCST variables were frequently found when compared to the control group with flat profiles based on the specific PASS deficit group. This suggests good convergent validity for the CAS as an intelligence measure in a psychiatric population. There were also associations with PASS weaknesses and deficits in academic areas on the WRAT-3, although many of the PASS weaknesses seemed to be related to overall deficits as opposed to specific academic weaknesses. For adolescent cases within the weakness groups, it was notable that the Planning/Attention group had higher scores on the MMPI-A Scale 4, Psychopathic Deviate and the depression content scale. In addition, it was surprising that having a Simultaneous weakness resulted in somewhat lower scores on Scale 8 and the depression content scale of the MMPI-A. This study also found that the CAS significantly predicted achievement as assessed by the WRAT-3, which offers

support for the predictive validity of the CAS in a psychiatric population. In addition, Full PASS standard scores predicted Spelling and Arithmetic better than the WISC-III Full Scale IQ. Limitations and directions for future research were discussed, as well as the relevance of this research to the field of School-Clinical Child psychology.

CHAPTER I

INTRODUCTION

There is an extensive body of literature, which attempts to describe the relationship between cognitive functioning and psychopathology. Specifically, there is sufficient evidence which suggests a strong relationship between psychiatric disorders and cognitive impairments (Boetsch, Green, & Pennington, 1992; Hinshaw, 1992; Prior, Smart, Sanson, & Oberklaid, 1999). However, the literature is unclear as to what subtypes of cognitive difficulties are linked with which types of psychiatric disorders. There are often disruptions in executive functioning, including attention and planning, as well as global deficits in information processing associated with various psychological disorders (Barkley, 1996; Rourke, 2000; Cornblatt, Obuchowski, Pollack, & Erlenmeyer-Kimling, 1999; Moffitt, 1993). In addition, although there is a great deal of literature which explores the high prevalence of learning disabilities and underachievement in psychiatric populations, psychiatric patients often present with other patterns of cognitive strengths and weaknesses that do not necessarily meet learning disability criteria.

Research linking specific cognitive patterns with specific psychological disorders offers clinicians a clearer understanding of these disorders and how to treat them. Although there is sufficient research to support the hypothesis of a relationship or an association between cognitive functioning and the presence of a psychiatric disorder, the degree and direction of the relationship between cognition and psychopathology is not clear. In addition

not all individuals with cognitive difficulties present with psychiatric symptoms and conversely not all individuals with psychiatric disorders have cognitive impairment. One way to examine the issue is to study cognitive deficits that are frequently found in psychiatric populations and within specific psychiatric disorders. There is also a great deal of research which has attempted to link specific learning disabilities to psychopathology (Hinshaw, 1992; Dalley & Bolocofsky, 1992). Other research has more broadly examined psychopathology that is associated with verbal deficits vs. nonverbal deficits (Rourke, 2000). To clarify this relationship some researchers have sought to identify subtypes of learning difficulties, which may be correlated with various psychopathologies.

The Wechsler scales have not been able to consistently be a diagnostic indicator of psychopathology going back to early research of Rapaport, Gill, and Schafer (1968) who attempted to predict psychiatric diagnosis using graphed representations of weighted scores. A greater understanding of this relationship will aid diagnosis, treatment, and prospective outcome. The Cognitive Assessment System (CAS) which was designed around the PASS theory of intelligence offers an alternative view of intelligence. Incorporating a measure of cognition based on a theory of intelligence might provide more useful and valid subtypes. It includes additional measure of planning, attention, and processing that might be impaired in a psychiatric population.

Naglieri and Das (1997a, 1997b) developed the Cognitive Assessment System (CAS) as an alternative measure of cognitive functioning based on the Planning, Attention, Simultaneous, and Successive (PASS) model and theory of intelligence. The PASS theory of intelligence developed from the neuropsychological work of A.R. Luria (Naglieri & Das,

1990). In particular, it purports to provide a more adequate measure of planning, attention, and overall executive functioning than currently popular IQ tests, thereby offering additional information for use in diagnosis and treatment planning. Research with the CAS has established it to have sufficient construct, content, and predictive validity, particularly in predicting academic achievement (Naglieri & Das, 1997a). The CAS has also demonstrated some clinical utility in identifying individuals with learning disabilities and attention deficit disorders in school settings (Naglieri & Das, 1999). However, there has been minimal research establishing it as a valid test for use with psychiatric populations.

The clinical use of profile analysis has been a qualitative tool used by clinicians to analyze patterns of cognitive functioning as well as the correlates between cognitive functioning and psychiatric disturbance. This research will utilize profile analysis through the application of a cluster analysis and a rule based classification method. This study will aim to explore the overall clinical utility of the CAS in a child and adolescent psychiatric population. Cluster analysis has become a statistical method commonly applied by psychologists to generate classifications of multivariate cognitive and neuropsychological data (Morris, Blashfield, & Satz, 1981). However, there are limitations to using cluster analysis, particularly in an exploratory fashion. Therefore, a rule based classification method was also employed to group the data. The rule-based approach utilized in this study was adapted from Naglieri's (1999, 2000) work on the utilization of cognitive weaknesses in profile analysis, which takes into account ipsative and intraindividual differences. This method provides a way for identifying the most common cognitive profiles found among CAS factor scores and determining how these profiles relate to achievement and other

cognitive and neuropsychological data, as well as psychopathology as defined by MMPI-A scale elevations.

PREVIEW

CHAPTER II

LITERATURE REVIEW

Relationship Between Psychopathology and Cognition

The following section will examine the relationship between psychopathology and cognition by exploring the literature related to specific psychiatric disorders and their observed cognitive correlates. The major diagnostic groups that were reviewed were the schizophrenia related disorders, behavior disorders, and depressive disorders. Attention Deficit Hyperactivity Disorder (ADHD) was also surveyed although separately from the behavior disordered diagnostic group because although it is frequently characterized as a behavior disorder, it can present with unique cognitive and neurological correlates.

Cognitive Correlates in Schizophrenia Related Disorders

The New York High-Risk Project (NYHRP) is a longitudinal study involving two samples of children at high-risk for schizophrenia (Cornblatt, et al., 1999). The study has been ongoing since 1971 and subjects have been followed into adulthood. They are considered high risk if they have one or both schizophrenic parents. They are compared to a group of children who are the offspring of parents with an affective disorder and a control group of children whose parents have no history of mental illness. One of the aims of this study has been to identify cognitive and behavioral precursors of schizophrenia and related disorders in order to better offer early intervention. This research has greatly influenced researchers and clinicians' understanding of schizophrenia. For the purpose of this review,

the information regarding some of the cognitive and neuropsychological markers of schizophrenia-spectrum disorders is useful to an understanding of the relationship between psychopathology and cognition.

One of the major findings of the NYHRP is that global deficits in attention have been found in children who are at risk for schizophrenia based on having a schizophrenic parent (Cornblatt, et al., 1999). The sample of at risk children with schizophrenic parents was compared to a control group and a group who had a parent with an affective disorder on a continuous performance test, which assesses attention. They used the Continuous Performance Test – Identical Pairs version (CPT-IP), a computerized measure of visual sustained attention, working memory, and other processing functions. The present study only examined the section of the test that involved the maximum attentional capacity, which required subjects to respond via a reaction-time key if the target pairs of a string of four digit numbers were alike. Analyses used signal detection indices as the authors indicated that it takes into account correct answers and commission errors and was felt to be most representative of overall processing ability. The observed deficits in sustained attention were unique to the schizophrenic at risk group of children. The study did not provide additional information which broke down the signal detection index into its component parts which defined sustained attention deficits. For example, it did not detail whether subjects had more omission errors throughout or towards the end of the test. In addition, these deficits in attention were related to later behavioral disturbances and to the development of schizophrenia-spectrum disorders in young adulthood at follow up.

These authors concluded that global attention deficits are markers for a predisposition for schizophrenia. They also noted that these deficits were stable over time and reflective of compromised attentional capacity. Theories of schizophrenia have proposed that deficits in attention are related to an overall lowering of processing capacity and likely result from developmental abnormalities (Nuechterlein & Dawson, 1984; Cornblatt, et al., 1999). Cornblatt et al. hypothesized that deficient attentional capacity affects the child's ability to pay attention to social cues and communication. This lowered ability to process social information leads to many of the interpersonal difficulties experienced by individuals with schizophrenic-spectrum disorders. The authors of this study note that although attentional deficits differentiated children at risk for schizophrenia from controls and from children at risk for affective disorders, CPT tests have not always been able to discriminate this group from other psychiatric disorders that are characterized by impairments in attention. Therefore they suggest that additional neurocognitive measures should be utilized as screening measures.

Another investigation of the NYHRP was that the Wisconsin Card Sorting Test (WCST), a measure of executive functioning, might be an indicator of early schizophrenic-spectrum disorders (Wolf, Cornblatt, Roberts, Shapiro, & Erlenmeyer-Kimling, 2002). They found that the offspring of schizophrenic parents had similar WCST profiles in that they achieved fewer sets, made more response set errors, and committed more perseverative errors. However, these noted executive function deficits did not distinguish high-risk subjects who subsequently became ill from those who did not.

Kumra, et al. (2000) examined two subsets of children with psychotic symptoms. The aim of the study was to determine whether a sample of children (n=27) with childhood onset schizophrenia (COS) were similar in neuropsychological deficits to a sample of children (n=24) with atypical psychosis defined as psychotic disorder not otherwise specified (PD-NOS). The PD-NOS group was a group of children who did not meet DSM-III-R criteria for schizophrenia at the time the study was conducted. They had brief hallucinations and delusions, but were lacking the pervasive impairments in cognition, emotional rapport, and more bizarre hallucinations which the COS group experienced. Their psychotic symptoms, although they were ego-dystonic and impaired functioning, were secondary to their intense emotional outbursts and periods of aggression. Despite social impairments this group actively sought social interaction as opposed to the COS group who did not seek out social relationships. The authors acknowledged that because the boundaries of a COS diagnosis are unclear, it is possible that some member of the PD-NOS group represented subtypes of COS. The two groups performed similarly on many cognitive and neurological measures including evidencing deficits in attention, learning, and abstraction, suggesting that the disorders have similar etiologies. However, the COS group had greater impairments in verbal learning on the Wide Range Assessment of Memory and Learning (WRAML) while being less impaired on the coding and digit symbol subtest of the WISC-R. Although not clarified in the study, based on the age range of the two samples, it is likely that they were all using the same version of the coding subtest on the WISC-R. One of the important and relevant findings made by these researchers was that the WISC-R IQ scores underestimated the cognitive and learning deficits exhibited by these two samples of COS and PD-NOS. Some of the weaknesses of this study

include the fact that the children were receiving psychotropic medications, the PD-NOS group was somewhat younger, inclusion an older version of the WISC, and the lack of a control group.

Although the majority of cognitive and neuropsychological studies of schizophrenics have involved adults, Asarnow et.al. (1994) conducted a series of neuropsychological and experimental tasks in an attempt to link CNS dysfunctions to behavioral findings of psychosis in children. They found similar deficits in attention and information processing that adult schizophrenics show. The major impairments included the following: impaired performance when required to attend to, remember, and respond to sequences of both verbal and nonverbal information exceeding their processing capacity; visual perception impairments; impairments in executive functioning as measured by the Wisconsin Card Sorting Test; and limited capacity for information processing.

The research reviewed regarding children and adolescents who are either at risk for developing a schizophrenia spectrum disorder or who have been diagnosed with a schizophrenia spectrum disorder suggests a number of consistently related cognitive impairments. Deficits in sustained attention and information processing have been noted across subjects. In addition, deficits in executive processing typically as assessed by the WCST were noted. There was also an impairment in verbal learning noted in one study. There were some limitations to the studies reviewed, as subjects at risk for schizophrenia differ from subjects who are presenting with psychotic symptoms. Some studies also acknowledged that CPT and WCST results could not distinguish schizophrenic subjects from other psychiatric groups.

Cognitive Correlates of Behavior Disorders

Behavior disorders including oppositional defiant disorder (ODD) and conduct disorder (CD) have also been linked to cognitive deficits as well as impairments in attention and executive functioning. Related to this, research has documented an association between antisocial behavior and patterns of neuropsychological functioning (Moffitt, 1993). Although not specifically measuring diagnoses of conduct disorder, much of the focus has been with juvenile delinquents and extrapolated to hypotheses regarding behavior disorders. One significant finding reviewed by Moffitt was that juvenile delinquents have an IQ score of one half standard deviation lower than their nondelinquent peers. However, he notes that for more serious offending juveniles who would likely meet criteria for conduct disorder, the difference is more than one standard deviation lower than normative comparison groups. Lower IQ scores in delinquent youngsters may be a function of the fact that there are higher incidences of PIQ>VIQ and a higher incidence of learning disabilities found in this population. However, the question of why antisocial behavior and IQ are related led researchers to investigate patterns of strengths and weaknesses to clarify the relationship. Results from a review of studies found that the two areas in which antisocial youngsters were impaired were “language based verbal skills and ‘executive’ self-control functions” (Moffitt, 1993, p. 137).

Verbal impairments in conduct disordered adolescents have also been documented (Moffitt, 1993). One theoretical explanation for this relationship is that “auditory verbal memory and verbal abstract reasoning are essential abilities in the development of self-control, and they influence the success of socialization” (Moffitt, 1993, p. 142). Research

with the Wechsler scales has continuously found support for Performance IQ>Verbal IQ (PIQ>VIQ) patterns in delinquents and provides evidence that a verbal deficit is prominent in delinquent youths. Another interesting finding noted by Henry, Moffitt, and Silva (1992) was that even though delinquents showed similar patterns of verbal deficits to individuals with learning disabilities, the delinquent youth had even more severe levels of verbal impairments on the WISC-R.

The other major deficit noted to be present in neuropsychological work with delinquents was a deficit in executive functioning (Moffitt, 1993). Executive functions were stated to include the ability to sustain attention and concentration, abstract reasoning, planning, concept formation, formulating goals, purposeful sequential behavior, self-monitoring, inhibition of impulsive behavior, and flexibility in shifting behavior. In Moffitt's review of the literature, the association between assessments of many of these functions and delinquency was found when compared to control groups or statistical norms. Having a dual diagnosis of CD and ADHD resulted in even greater impairments in executive functioning (Moffitt & Henry 1989, as cited in Moffitt, 1993).

Separate but related to behavioral disorders are studies of aggression. This is a frequent symptom of young children and adolescents admitted to psychiatric hospitals. One study that examined impulsive aggressive acts as distinct from premeditated aggressive acts found inefficient executive functioning on many different measures used (Villemarette-Pitman, Stanford, & Greve, 2002). This study included language measures in addition to measures of executive functioning. Language deficits as noted earlier have been thought to be involved in aggressive impulsive behavior. Results found that impulsive aggressive college

students had difficulties with organization and planning of complex verbal output, perceptual accuracy of visual stimuli, and “reduction in ‘well-formedness’ of speech” (Villemarette-Pitman, et.al., 2002). The authors concluded that it is the deficits in executive functioning which impair their performance on complex verbal tasks. Unfortunately this study utilized self-reported aggression in college students, who can be considered a higher functioning sample in general. Therefore, the findings may not be generalizable to other populations.

In summary, the research indicates that delinquent and antisocial behavior which characterizes behavior related disorders is correlated with a number of cognitive impairments. Studies have found these youngsters to have lower Full Scale IQs, which may be partially explained by the typical pattern of PIQ>VIQ in these subjects. There are also impairments in self-control executive functions, particularly as they relate to verbal abilities. These executive self-regulation impairments are also correlates of Attention Deficit Hyperactivity Disorder.

Cognitive Correlates of Attention Deficit Hyperactivity Disorder

There has been a great deal of research regarding the cognitive and neuropsychological correlates of attention deficit hyperactivity disorders (ADHD). Barkley (1996) summarized some of the common cognitive impairments associated with ADHD to include: motor coordination and sequencing, working memory and mental computation, planning and anticipation, verbal fluency, effort allocation, applying organizational strategy, internalization of self directed speech, adhering to restrictive instructions, and self-regulation of emotional arousal. Barkley (1996) notes that these impairments all fall under the domain of executive cognitive functions. Executive functions as defined by Barkley (1997) include