

PREDICTIVE VALIDITY OF KINDERGARTEN SCREENERS FOR YOUNG  
CHILDREN WITH READING DIFFICULTIES

by

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ABSTRACT

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Research has long shown the importance of reading and the importance of early intervention to ensure all children have the opportunity to develop into competent readers. The most effective method for identifying children early has been researched and is open to debate. One way to identify children early on in their academic career is through kindergarten screening instruments. These tools are widely available and used in a majority of school districts today. Kindergarten screening instruments are not however without criticism. One such criticism is they lack sound psychometric properties such as adequate validity, reliability, and standardization. One way to make screeners more sound is to validate them using current empirically based theories of cognition.

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## Chapter I

### Introduction

Given what research has shown over the past decade it is somewhat of an understatement to say that learning to read is fundamental to school success (Lonigan, Burgess & Anthony, 2000; Spodek & Saracho, 1994) as well as success later in life. The importance of reading cannot be underemphasized because it is the one academic domain that permeates every other academic subject area. To be successful in math, science, history, and literature students must have sufficient reading skills. Beyond high school, having insufficient reading skills means having limited access to occupational and vocational opportunities (Torgesen, 2002). In 1998, the National Institute for Literacy (as cited in U.S. Department of Education [USDE], 2001) reported 75% of today's jobs require no less than a ninth grade reading level, so it is not surprising to find the average welfare recipient aged 17-21 reads at the sixth grade level (USDE, 2001).

In 1997, President Clinton launched a national literacy initiative called, "The American Reads Challenge," which aims to ensure that children become good readers by the completion of third grade (USDE, 2001). While there is recognition of the importance of literacy at the federal level, there is also support at a more local level. A study done by Hart (as cited in USDE, 2001) found that the majority of teachers and parents surveyed agreed that reading is the most important subject for children to learn.

Because acquiring the proper reading skills is so important to a child's immediate and future success, it is imperative to identify, help, and monitor children at an early age who may be at risk for learning to read. Felton and Pepper (1995) wrote that failure to obtain basic reading skills early on often leads to "avoidance of reading and decreased

exposure to print” (p. 405), which can contribute to difficulties with reading comprehension later on in the child’s academic career. Catts (1997) wrote that children who struggle with reading at an early age are less motivated to read, develop lower expectations of their abilities, and have less practice in reading than those children who are not struggling. A study done by Juel (1988) found that 88% of students who had difficulty learning to read at the completion of first grade continued to have difficulty at the end of fourth grade. Another study conducted by researchers at Yale University (as cited in USDE, 2001) found the problem continued on through high school.

One way in which professionals can help identify children with possible reading problems at an early age is through early screening programs such as kindergarten screening instruments. Today many schools require the use of kindergarten screening tools, which help professionals obtain a picture of the child’s readiness skills or developmental level. The increased use of kindergarten screening is due in part to the Education for All Handicapped Children Act of 1975 (PL 94-142) that required states to locate, identify, and provide services to all children with disabilities, not just school age children with disabilities. Southworth, Burr, and Cox (as cited in Costenbader, Rohrer, & Difonzo, 2000) stated that in response to the law, by 1980 there were over 1,000 screening tools published in the United States. The second wave in the increased number of screening tools came about from the National Educational Goals 2000, which states in part that all children will start school ready to learn (Costenbader et al., 2000).

There has been a considerable amount of research done on the predictive value of kindergarten screening tools in predicting retention (Wenner, 1995), at-risk students (Roth, McCaul & Barnes, 1993), academic achievement (Schmidt & Perino, 1985), and

bright students at-risk for learning difficulties (Kelly & Peverly, 1992). However, there has not been a notable amount in regard to predicting reading difficulty. A review of the literature has yielded a small number of research studies (Flynn & Rahbar, 1998; Fraas & Crail, 1992) done in the past ten years using kindergarten screening tools to predict problems with learning to read.

While there has been research done on the predictive validity of kindergarten screening instruments, the instruments themselves are not without criticism. A major criticism of kindergarten screening tools is the lack of theoretical backing (Wenner, 1995). The present study intends to apply a current theory of cognitive abilities to kindergarten screening instruments in hopes that portions of many current screening instruments will be found to assess possible indicators of reading problems. For the above mentioned reason, and because there is little research on predictive validity of kindergarten screening tools for the early identification of reading problems, this is an area of research that is in need of further investigation.

For the majority of children, learning to read will not be a source of extreme difficulty and frustration; however, for other children it will be. The research repeatedly tells us about the importance of developing good reading skills and because of this it is imperative not to let children who struggle with basic reading skills miss out on intervention opportunities. Intervening early in a child's academic career could alleviate the frustration some children have learning to read. Thus the importance of finding the best early indicators of reading difficulties is vital to early intervention.

The latest theory of cognitive abilities to receive attention in the assessment world is the Cattell Horn Carroll (CHC) theory of intellectual functioning. The theory is based on the work of John Carroll, John Horn, and Raymond Cattell, and is founded in Carroll's factor analytic study of over 460 data sets from which he proposed a three-stratum theory of cognitive abilities (Carroll, 1997). The theory also encompasses work done by Horn and Cattell; their body of work is referred to as Gf-Gc theory (Horn & Noll, 1997).

Briefly, CHC theory states intelligence is multifaceted with 9 to 10 broad abilities and approximately 69 narrow abilities. Because there is a slight discrepancy between the Carroll and Cattell-Horn models in regard to the number of broad abilities each proposes, McGrew (1997) has recommended the following ten broad factor categories:

1. Comprehension-Knowledge (Gc)
2. Long-Term Retrieval (Glr)
3. Visual Processing (Gv)
4. Auditory Processing (Ga)
5. Fluid Reasoning (Gf)
6. Processing Speed (Gs)
7. Short-Term Memory (Gsm)
8. Quantitative Knowledge (Gq)
9. Reading and Writing (Grw)
10. Decision/ Reaction time (Gt)

In regard to reading, research has implicated several broad factors in reading ability (Evans, Floyd, McGrew, & Leforgee, 2001; McGrew, Flanagan, Keith, & Vanderwood, 1997). Research conducted by Evans et al. (2001) found measures of Gc

(general language abilities) had strong correlations with reading, while measures of Gsm, Ga, Gs, and Glr produced moderate correlations with reading. McGrew et al. (1997) found Ga and Gc to be factors in reading ability.

### *Statement of the Problem*

The purpose of this study is to determine if kindergarten screening tools have any predictive utility in regard to identifying future reading problems. Data will be collected by completing a review of the kindergarten screening measures given to a sample of first through third grade children during the spring of 2003. The same children will also be administered select subtests of the Woodcock-Johnson III Tests of Cognitive Abilities (WJ-III COG; Woodcock, McGrew, & Mather, 2001) and Woodcock-Johnson Tests of Achievement (WJ-III ACH; Woodcock, McGrew, & Mather, 2001) during the spring of 2003. The children will be recruited from a western Wisconsin school district.

### *Research Questions*

The following research questions will be addressed upon completion of the study:

1. Are kindergarten screening instruments useful in identifying children at risk for reading difficulties?
2. What components of kindergarten screening instruments are most useful for identifying reading problems?

### *Definition of terms*

The following terms need to be operationally defined for clarification in this study:

Automaticity- the process by which reading becomes fast, automatic, and requires only limited use of cognitive resources.

Gf-Gc theory- the original theory developed by Cattell viewed the theory as involving two intelligences: fluid (Gf) and crystallized (Gc). The theory later evolved to become a theory of several intelligences or cognitive abilities. The theory is a descriptive account of abilities that characterize our capacities as humans to create and deal with complexities (Horn & Noll, 1997).

Reading Fluency- the speed at which an individual can accurately read words.

Phonemic Awareness- the understanding that speech can be segmented or broken down into small sounds or phonemes. In the English language there are 44 phonemes.

## Chapter II

### Review of Literature

The purpose of this chapter is to review relevant literature regarding early screening instruments, specifically kindergarten screening instruments, and their use in identifying children at risk for reading difficulty. The chapter will discuss the importance of reading as it relates to a child's current and future functioning. The chapter will also include a critical look at early reading skills, early identification and intervention as well as a current theory of intellectual functioning as it relates to reading acquisition.

#### *The Importance of Reading*

"Reading is the key that unlocks virtually all other learning" (USDE, 2001, p. 3). All other learning refers to learning in school and beyond. Children who succeed in reading are more likely to succeed in school and become productive members of society (Casey & Howe, 2002). In school, the large majority of information is taught through the written word. Being able to decode print and take meaning from it is essential to learning. To be successful in math, science, history, and literature for example, children must be able to read at a proficient level. Reading skills have been found to affect a child's general knowledge, spelling skills, writing skills, and vocabulary development (Lyon, 1997).

From a motivational standpoint, children who have difficulty learning to read have fewer positive experiences with learning and are not as excited about learning as children who do not experience difficulty learning to read, thus their motivation to succeed is not as great as it could be (Catts, 1997; Lyon, 1997). In his work for the National Institute of Child Health and Human Development, Lyon (1997) found by the

end of first grade children's self-esteem, self-concept and motivation all suffer if they are not able to master reading skills. Additional research supports these findings and other behavioral issues, which include aggravation or development of emotional/behavioral problems and school dropout (Good, Simmons, & Smith, 1998).

Children who struggle with reading may also avoid reading aloud and seek fewer opportunities to read at home and school, which leads to fewer opportunities to practice and develop strategies for reading comprehension (Lonigan et al., 2000). Conversely, children who do not experience difficulty learning to read will seek out and have more exposure to the written word, which increases their exposure to knowledge (Lonigan et al., 2000). These children will gain more experience with books and may have an edge in reading comprehension when the switch from learning to read to reading to learn occurs later in school (Felton & Pepper, 1995). Since the average child needs between 4-14 exposures of a word before it becomes automatically recognized, the decreased exposure to words that poor readers receive is alarming (Lyon, 1997).

What is equally alarming is that the majority of children referred for special education are children who are having trouble learning to read (Felton, 1992). Within special education, children with a reading disability make up the largest portion of children with a learning disability (Felton, 1992). Whether children are served through special education or regular education, it is important to address the needs of children who have difficulty reading to prevent the negative effects from following them into adulthood.

Unfortunately, children who experience difficulty learning to read often experience reading problems in adulthood (Bruck, 1998). In adulthood, reading

continues to remain important to obtaining knowledge about the world as well as functioning within the job market. Our job market currently places more emphasis on literacy than ever before. As was mentioned previously, 75 % of today's jobs require, at a minimum, a ninth-grade reading level (USDE, 2001). Eight out of the ten fastest growing jobs require a college education or moderate to long-term post secondary training. Adults who do have a college education earn, on average, 76% more than adults who have a high school diploma (USDE, 2001). It is not surprising then, to find that low literacy is strongly related to poverty. Forty three percent of individuals who live in poverty have the lowest reading skills (USDE, 2001).

#### *Early Identification of Reading Difficulty*

About half of all children will learn to read regardless of how they are taught (Lyon, 1997). An estimated 20 to 30% of children, however, will demonstrate a significant difficulty learning to read and will require intensive instruction (Lyon). Waiting too long to meet the needs of these children will result in their continued struggle with reading. As was mentioned earlier, Juel (1988) found that 88% of students who had difficulty learning to read at the completion of first grade continued to have difficulty at the end of fourth grade. Another study in 1997 by researchers at Yale University (as cited in USDE, 2001) found three-quarters of children who were poor readers in third grade remained poor readers in high school.

Intervening early is important for all the reasons discussed previously in this chapter as well as from a cognitive energy perspective (Casey & Howe, 2002; Lyon, 1997). Children with reading difficulties use more cognitive energy decoding words than children without reading difficulties. Children who take longer to sound a word out,

blend the phonemes of that word together and pronounce the word correctly use much more of their cognitive resources than children who are able to read words more fluently and automatically. Fluent readers use their resources to integrate and comprehend what they have read. Whereas non-fluent readers use their resources to decode the words they are reading and thus have less cognitive energy left over to comprehend and take meaning from the words (Bruning, Schraw, & Ronning, 1999; Casey & Howe, 2002).

A current practice in the schools that is in conflict with early identification of children with reading difficulties is the IQ-achievement discrepancy model. This model requires a discrepancy between a child's intelligence and reading achievement before that child can receive special education services. Several studies have been conducted that challenge the discrepancy model (Fletcher et al., 1994; Hurford, Schauf, Bunce, Blaich, & Moore, 1994; Stanovich & Siegel, 1994). These studies found children with phonological processing deficits, which are considered core deficits in reading, have these deficits regardless of their overall intellectual abilities. The Hurford et al. study (1994) found no difference between poor readers and readers who qualified for a reading disability; both groups had deficits in phonological processing. All children who struggle with reading should be able to obtain access to special interventions regardless of an IQ-achievement discrepancy.

### *Early Reading Skills*

There is a wealth of research that has been conducted on pre-reading skills (Felton & Pepper, 1995; Good et al., 1998; Lonigan et al., 2000; Whitehurst & Lonigan, 1998) and basic reading skills. Recently (2001) the National Reading Panel screened over 30 years of reading research. The report, titled "Teaching Children to Read," discusses

phonemic awareness, phonics instruction, fluency, comprehension, teacher education, and reading instruction in relation to pre-reading and basic reading skills (National Institute of Child Health and Human Development, 2001).

In their 1995 book, Hart and Risley (as cited in Casey & Howe, 2002) conducted research on parent-child interactions and found by the time children enter kindergarten at the age of five they have obtained the majority of their pre-reading skills through parent-child interactions. Children can develop their vocabularies, understand the concepts of print, develop phonemic awareness, and gain an overall positive attitude toward reading through countless hours of storybook reading. Likewise, Snow, Burns and Griffin (as cited in Casey & Howe, 2002) discuss four early reading skills that should be in place before learning to read can occur. The skills are, being familiar with the concepts of print, learning to recognize letters by name, associating sounds with letters or letter combinations and understanding the meanings of a multitude of spoken words and phrases (i.e., vocabulary development). Being familiar with the concepts of print refers to the understanding that print is read from left to right, top to bottom, and front to back. Associating sounds with letters or letter combinations refers to the alphabetic principle and phonemic awareness.

In the above-mentioned pre-reading skills, a subskill of phonemic processing, phonemic awareness is mentioned. Phonemic processing skills have been heavily researched (Hurford, Johnston et al., 1994; Hurford, Schuaf et al., 1994; Felton, 1992; Mann & Liberman, 1984), and from this research much is known about the skills as they relate to basic reading. Felton (1992) sampled 221 Kindergarten children who were rated by their teachers in regard to predicted ability to acquire basic reading skills. These

children were given 19 separate measures of phonological awareness, phonological coding in working memory and lexical access. Felton found three measures, which included general ability, rapid naming of letters, and beginning sound discrimination, accounted for 41% of the variance in third grade reading skills. When general ability was removed from the picture, rapid letter naming, beginning sound discrimination and auditory discrimination measures predicted reading outcome in third grade (Felton, 1992).

A recent study conducted by Lonigan et al. (2000) found phonological sensitivity (i.e., sensitivity to words, onset-rime, phonemes, and syllables) and letter knowledge (knowledge of the letters of the alphabet and their corresponding sound) accounted for 54% of the variance in kindergarten and first grade students decoding abilities.

From these studies and others we can see the emergence of three core-reading skills necessary to developing good readers. These three skills are phonological awareness, alphabetic understanding, and automaticity (Casey & Howe, 2002). Given the importance of reading and what we know about core skills, it is expedient instruments we use to assess young children adequately sample these components.

### *Kindergarten Screening*

Currently there are two types of early screening instruments in use today. Preschool screening instruments look at skills and experiences that a child has prior to starting preschool or approximately the age of three. While Kindergarten screening instruments seek to discover the types of skills a child has prior to starting Kindergarten. Today due to increased demands for educational accountability and demands for

academic performance in kindergarten the number of kindergarten screening instruments have increased substantially (Costenbader et al., 2000).

There has been a considerable amount of research done on the predictive value of kindergarten screening tools in predicting remediation or retention (Wenner, 1995), at-risk students (Roth et al., 1993), academic achievement (Schmidt & Perino, 1985), and bright students at-risk for learning difficulties (Kelly & Peverly, 1992). Wenner studied 95 white middle-class children in suburban Buffalo, New York. The children, 47 boys and 48 girls, were given three screening measures to predict teacher recommended retention or remediation at the end of Kindergarten. The first screening measure was a Piagetian task instrument designed specifically for the study. The remaining two screeners were the Brigance K-1 Screen (Brigance, 1987) and the Merrill Language Screening Test (Mumm, Secord & Dykstra, 1980). Wenner (1995) found the Piagetian task instrument to be a poor predictor of teacher recommended retention or remediation, while the published screeners were predictive of the teacher's recommendations.

In an earlier study, Schmidt and Perino (1985) looked at several published screeners and their predictive utility in regard to academic achievement; children at risk for school failure and children with high achievement potential. The participants were 378 students, 201 boys and 177 girls, in a school district in a suburb of New York City. In 1978 while the students were in Kindergarten they were given a battery of kindergarten screening instruments. At the completion of second grade the children were given an achievement and ability test to determine the predictive value of the kindergarten screening instruments. The results indicate that the screening instruments

administered were good predictors of children classified as those in need of special education services as well as those students who were high achievers.

Lastly, research conducted by Kelly and Peverly (1992) looked at kindergarten screening instruments and their predictive utility in regard to identifying bright kindergarteners at risk for learning difficulties. Prior to kindergarten entry, the children were given the Kindergarten Screening Battery. Thus, the participants in the study were 111 boys and 104 girls for whom results of the KSB were available. The results of the study indicate that the KSB is a good predictor of first and second grade reading achievement.

While there is a multitude of research on predictive validity of early screening instruments there has not been a notable amount of research in regard to predicting reading difficulty. A review of the literature has yielded a small number of research studies (Flynn & Rahbar, 1998; Fraas & Crail, 1992) done in the past ten years using kindergarten screening tools to predict problems learning to read.

Flynn and Rahbar (1998) found a kindergarten screening instrument was able to predict 80% of poor readers in their sample. The researchers sampled 1,972 children from school districts in Minnesota and Wisconsin. The theory-based kindergarten screening instrument was composed of subtests measuring phonemic awareness, logographic/orthographic processing and semantics.

The study done by Fraas and Crail (1992) was conducted to determine if kindergarten screening scores could be used to predict which students would qualify for a reading intervention program in the first grade. The participants were 243 students from seven elementary schools in a small city in Ohio. All 113 males and 130 females had

completed the school district's kindergarten screening tests which included assessment of gross motor skills, fine motor skills, perceptual skills, and general knowledge. The scores from these measures served as the predictor variables. The criterion variables were performance below the 36<sup>th</sup> percentile on the Iowa Test of Basic Skills (Hieronymus, Hoover & Lindquist, 1986) taken in kindergarten, or performance below the 36<sup>th</sup> percentile on the Gates-MacGinitie Reading Test (MacGinitie & MacGinitie, 1989), and teacher recommendation in first grade. The study found the general knowledge scores from the kindergarten screening instruments played a significant role in the classification of the students. The study also found the model used to identify children as needing inclusion in the school districts reading program produced a "low percentage of false-positive classifications" (Fraas & Crail, 1992, p. 10) and thus was determined to be an acceptable model for use in the district.

At this point it is important to point out that Kindergarten screening instruments are not without criticism (Costenbader et al., 2000). As mentioned previously, Wenner (1995) pointed out prior critiques of kindergarten screening instruments' lack of theoretical basis. In 2000, the National Association of Early Childhood Specialists (NAESC) released its position statement on current unacceptable trends in kindergarten entry and placement. One of their positions argues kindergarten screeners need to be held to acceptable standards of reliability and validity. In their article on current practice in kindergarten screening, Costenbader, Rohrer, and Difonzo (2000) agree, "kindergarten screening should be based on adequate standardization, reliability, and validity" (p. 323). One way to make screeners more sound is to validate them using current empirically based theories of cognition. One such theory is CHC theory.

*CHC Theory*

Carroll-Horn-Cattell (CHC) theory is comprised of work conducted by John Carroll, John Horn, and Raymond Cattell (McGrew et al., 1997). CHC theory is based on factor analytic studies conducted largely from the psychometric perspective and is considered the most thorough and well researched multiple view of intelligence to date (McGrew et al., 1997; Evans et al., 2001). Briefly CHC theory proposes a hierarchical view of intelligence consisting of three strata: general cognitive ability or *g* at the top, followed by ten broad band abilities, followed by approximately 70 narrow band abilities at the lowest level (Evans et al., 2001). Table 1 provides an overview of the ten broad band abilities.

The evolution of CHC theory shows it came into being based on work conducted by Raymond Cattell. From Cattell's work, Horn developed a theory of intelligence based on nine broad cognitive abilities: Fluid Intelligence (*Gf*), Crystallized Intelligence (*Gc*), Short-Term Acquisition and Retrieval (*Gsm*), Visual Processing (*Gv*), Auditory Processing (*Ga*), Long-Term Storage and Retrieval (*Glr*), Cognitive Processing Speed (*Gs*), Correct Decision Speed (CDS), and Quantitative Knowledge (*Gq*).

In 1993 Carroll's factor analytic study of over 460 data sets found Cattell-Horn's model of multiple intelligence to be the most well grounded, acceptable theory of intelligence (McGrew et al., 1997). However, Carroll's work suggested slightly different broad band abilities: Fluid Intelligence (*Gf*), Crystallized Intelligence (*Gc*), General Memory and Learning (*Gy*), Broad Visual Perception (*Gv*), Broad Auditory Perception (*Gu*), Broad Retrieval Ability (*Gr*), Broad Cognitive Speediness (*Gs*), and Processing Speed/Reaction Time Decision Speed (*Gt*) (McGrew, et al., 1997). To reconcile the

differences in Carroll and Cattell-Horn's broad band abilities, McGrew (1997) proposes using the broad band abilities discussed in table 1.

Research has been done using CHC theory, specifically broad band abilities, to predict achievement in several academic domains such as math and reading (Evans et al., 2001; McGrew et al., 1997). In regard to reading, research has implicated several broad factors in reading ability (Evans, et al., 2001; McGrew, et al., 1997). In 1993 McGrew found using the Woodcock-Johnson Psycho-Educational Battery-Revised (WJ-R; Woodcock & Johnson, 1989) that measures of Comprehension Knowledge (Gc) "demonstrated the strongest relations with reading clusters at almost all age levels" (cited in Evans et al., 2001, p. 248). Additional contributors were Auditory Processing (Ga), Processing Speed (Gs), and Short-Term Memory (Gsm).

McGrew et al. (1997) also conducted research with the WJ-R to determine the relationship between *g*, seven broad band abilities, and math and reading skills. In regard to reading, the researchers discovered in grades one through two, *g* had the biggest effect on reading. With *g* removed from the equation Auditory Processing (Ga) and Comprehension Knowledge (Gc) had significant effects on reading.

Lastly, Evans et al. (2001) used the standardization sample from the WJ-III COG to investigate the utility of the WJ-III COG in predicting basic reading skills and reading comprehension across childhood and adolescence. The researchers found Comprehension Knowledge (Gc) and Short-Term Memory were significantly related to Basic Reading Skills. Additionally, Auditory Processing (Ga), Long-Term Retrieval (Glr), and Processing Speed (Gs) demonstrated significant relationships between Basic Reading Skills during the early years of learning to read.

Table 2.1

*CHC Broad Band Abilities*

Abilities and Symbol	Definition
Fluid Reasoning (Gf)	Ability to use novel information/procedures to reason, form concepts, and problem solve
Comprehension-Knowledge (Gc)	General knowledge and knowledge of a culture including verbal communication and reasoning with previously learned procedures
Visual Processing (Gv)	Ability to analyze and synthesize visual information
Auditory Processing (Ga)	Ability to analyze and synthesize auditory information
Processing Speed (Gs)	Ability to perform automated cognitive tasks quickly
Short-Term Memory (Gsm)	Ability to hold information in immediate awareness and use the information with a few seconds
Long-Term Retrieval (Glr)	Ability to store and retrieve information
Quantitative Knowledge (Gq)	Ability to understand quantitative concepts and relationships and manipulate numerical symbols
Correct Decision Speed (CDS)	Ability to solve comprehension, reading, and problem solving tasks quickly and accurately
Reading and Writing (Grw)	Ability to read and write and English language ability

*Note.* Adapted from “Beyond g: The impact of Gf-Gc specific cognitive abilities research on the future use and interpretation of intelligence tests in the schools,” by K.S. McGrew, D.P. Flanagan, T.Z. Keith, and M.L. Vanderwood, 1997, *School Psychology Review*, 26, p.193. Copyright 1997 by NASP. Adapted with permission.

All of the above mentioned studies have a common thread; each used a Woodcock-Johnson assessment tool to assess broad band abilities based on CHC theory. The Woodcock-Johnson III Test of Cognitive Abilities (WJ-III COG) and Woodcock-Johnson III Tests of Achievement (WJ-IIIACH) are considered excellent measures in the assessment field for measuring reading skills (Evans et al., 2001; McGrew et al., 1997). The tests are based on CHC theory and purport to measure all of the abilities discussed in the previous paragraphs.

### Chapter III

#### Methodology

This chapter will explain the methods used in the proposed study. The chapter will include information regarding how the subjects will be selected, a description of the subjects, and the proposed instrumentation. The chapter will also include information regarding data collection, data analysis, and will conclude with limitations of the proposed study.

##### *Subject selection and description*

Approximately 30 children will be selected to be involved in the study. Children who are in grades one through three will be targeted for participation. The children will be recruited from several school districts in western Wisconsin and will have kindergarten screening results in their respective cumulative files. Lastly, an effort will be made to obtain equal numbers of boys and girls for participation in the study. The children will be randomly selected from the larger student body, regardless of special education classification.

School districts in western Wisconsin will be approached to participate in the study. Once approval has been obtained by the district, children who have kindergarten screening results available in cumulative files will be recruited to participate in the study. Parents whose children are eligible will be sent a brief description of the study with a letter of consent.

##### *Instrumentation*

The study will use two types of instrumentation. The first type will be the kindergarten screening instrument the children in the study will have in their file. After

consent has been obtained from the prospective school districts a copy of the kindergarten screening test will be acquired. An effort will be made to recruit districts that use similar screening tests.

The second instrument in the proposed study will be a battery of subtests from the WJ-III COG and WJ-III ACH (Woodcock, McGrew & Mather, 2001). The WJ-III COG is a standardized test of cognitive abilities that measures an individual's overall ability as well as strengths and weaknesses. The WJ-III ACH is a standardized test of achievement and measures an individual's achievement as well as strengths and weaknesses. Both tests are based on CHC theory and measure seven of the ten broad band abilities set forth by the theory. The tests have substantial history and show exceptionally strong psychometric properties.

#### *Data Collection*

As mentioned previously, once permission has been obtained from the school districts and the parents, kindergarten screening results will be obtained from the district. Students ranging from grades one through three will then be administered select subtests from the WJ-III COG and WJ-III ACH. The administration of the select battery will be conducted according to standardized procedures set forth by the test authors. The testing will be done in a one-on-one manner with efforts made to limit distractions (i.e. quiet room, child-sized seating). Lastly, those who administer the testing will have had prior experience and training in administration of the WJ-III COG and WJ-III ACH. To ensure proper administration and reliability 1/3 of the battery protocols will be reviewed.

### *Data Analysis*

Data will be analyzed using SPSS<sup>®</sup> to assess predictive utility of the kindergarten screening instruments. Exploratory analysis will be conducted to investigate predictive utility of specific items from the instruments.

### *Assumptions and Limitations*

Several assumptions are made in this study. The first assumption is the WJ-III will be correctly administered and scored. The second assumption is the tests given measure what they purport to measure. The third assumption is the Kindergarten screening tools were correctly administered. In addition to the lack of control over the administration of the screening instruments, the non-uniformity between the screening instruments is a limitation of the proposed study. Another limitation of the proposed study is the restricted geographical location. The children will be recruited from communities in western Wisconsin where there is not a wide range of socio-economic status and multi-cultural basis representative of the U.S. The ability to generalize the results to other regions will be minimal. The findings may only be generalized to communities with similar multi-cultural and socio-economic backgrounds. The age of the children recruited is another limitation of the study. The children will be first through third grade students and thus the generalization to other students of different ages may be restricted.

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