

AN ABSTRACT OF THE THESIS OF

Reg Alan Ayres for the Master of Science

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Title: A Comparison of Selected Subtest Scores On the Wechsler Adult Intelligence Scale-Revised-Neuropsychological Instrument (WAIS-R-NI) and the Dementia Rating Scale (DRS) in Classifying Dementia

Abstract approved: 

The purpose of this study was to investigate the relationships between the Verbal subtests of the Wechsler Adult Intelligence Scale-Revised-Neuropsychological Instrument (WAIS-R-NI) and the Initiation/Perseveration subtest of the Dementia Rating Scale (DRS) in classifying dementia. Additionally, DRS raw scores and WAIS-R-NI scaled score ranges were compared independently to Verbal IQ scores to determine a degree of relationship. The sample consisted of 30 senior citizens (females and males) ranging in age from 65 to 79. Both the WAIS-R-NI and DRS were administered to each participant. Scores for both tests were recorded for each participant. For the clinical sample, demographic information was obtained from medical records through the assistance of nursing home staff. This information included gender, date of birth, date of medical diagnosis for dementia and medications affecting alertness.

Pearson product-moment correlation coefficients were calculated to determine the relationships between the DRS raw scores, WAIS-R-NI Verbal subtest scaled score ranges and Verbal IQ scores. A 2 X 2 chi square test of independence was calculated separately for the WAIS-R-NI and DRS subtests. This was done to determine if the expected test scores, categorized as medical diagnoses (dementia or non-dementia), corresponded with the observed scores in classifying dementia from non-dementia. Participants were

categorized by two levels, medically diagnosed dementia and non-dementia.

Correlations indicated no significant relationships between the produced scores of DRS and Verbal IQ , or WAIS-R-NI and Verbal IQ. Participants in the non-dementia group had higher Verbal IQs than those medically diagnosed with dementia.

Two chi square analyses were calculated separately for the DRS and the WAIS-R-NI. The results indicated that the DRS Initiation/Perseveration subtest identified correctly 100% of the dementia and non-dementia participants. The WAIS-R-NI scaled score range correctly identified 13% of the dementia participants, and 100% of those with non-dementia. Results suggest that the DRS is effective as a discriminant function between dementia and non-dementia cases. The WAIS-R-NI scaled score range appears to be more favorable for identifying non-dementia over dementia participants but may not be considered a valid discriminant.

These results indicate that the DRS Initiation/Perseveration subtest does correctly identify those individuals diagnosed with dementia and may be effective in detecting cognitive decline in those suspected of having brain organicity. However, its use may only be suggested for determining if a more comprehensive examination is warranted. Caution should be used when using the WAIS-R-NI scaled score range to differentiate dementia from non-dementia.

**A Comparison Of Selected Subtest Scores On The Wechsler Adult
Intelligence Scale-Revised-Neuropsychological Instrument (WAIS-
R-NI) And the Dementia Rating Scale (DRS) In Classifying
Dementia**

A Thesis

Presented to


**the Division of Psychology and Special Education
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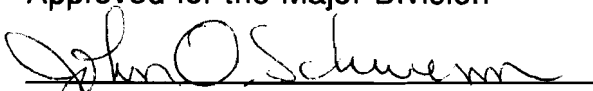
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CHAPTER 1

Introduction

Throughout history research contributing to the understanding of intelligence has produced significant information in the clinical arena. Following 50 years of development, the Wechsler series of intelligence scales continues to be highly regarded by psychologists as a useful tool for the assessment of adult intelligence. The Wechsler Adult Intelligence Scale-Revised (WAIS-R) extends the line of test development that began with the publication of the Wechsler Bellevue Intelligence Scale in 1939, and continued with its revision, the WAIS, published in 1955 (Wechsler, 1981). When the Wechsler Adult Intelligence Scale (WAIS) was developed, much consideration was given to problem solving strategies to understand better how examinees with different brain dysfunctions perform on standardized tests (Kaplan, Fein, Morris & Delis, 1991). Despite their widespread use by neuropsychologists, the WAIS and WAIS-R were not designed to diagnose brain dysfunction.

The demand for more discriminating assessment techniques suggests the need for more comprehensive screening tools when one is attempting to rule out brain dysfunction. While the impaired individual is faced with complex problems, he or she would require more highly specialized diagnostic methods sensitive to neurocognitive and neurobehavioral decline. Among the more recently developed tools designed to assess neurocognitive deficit is the Wechsler Adult Intelligence Scale - Revised - Neuropsychological Instrument (WAIS-R-NI) (Kaplan et al., 1991).

The WAIS-R-NI was designed to provide a profile of spared and impaired cognitive functions. This instrument offers modifications in

administration and scoring procedures which allow for a more systematic analysis of subtest scatter. It is anticipated that this tool may serve as a more effective neuropsychological screening device in assessing whether a more comprehensive follow up is needed. Researchers have investigated the WAIS-R's utility beyond its primary purpose placing emphasis on its ability to aid in differentiating functional from organically-based disorders. A degree of caution should be exercised; however, since its use as a comprehensive tool may result in unfair diagnostic overgeneralizations about the consumer suspected of brain impairment.

Statement of Purpose

The purpose of this study is to establish empirical evidence indicating the degree to which a range of WAIS-R-NI intersubtest scatter can differentiate between normal controls and those diagnosed with Senile Dementia of the Alzheimer's Type (SDAT). Subsequently, criterion-related validity will be assessed for each instrument in an effort to determine the degree to which each test differentiates between high and low performance. Additionally, the six WAIS-R-NI Verbal scales will be compared with one subtest from the Dementia Rating Scale (DRS) (Initiation/perseveration subtest). The degree to which these two instruments concur in differentiating between normally healthy subjects and those medically diagnosed with dementia will be determined.

It is hypothesized that those individuals diagnosed medically with dementia will indicate a significant degree of WAIS-R-NI subtest variability or "scatter" beyond the level associated with normal brain function. It is expected that a high level of scatter, indicated by a larger range, will be associated with a Dementia Rating Scale (DRS) manual's recommended diagnostic cut-off raw score of 28 or lower (for presence of impairment), while a smaller scatter index

would be associated with a higher DRS raw score of 29 or higher on the initiation/perseveration subscale.

McLean, Kaufmann and Reynolds (1989) asserted that individuals with at least some college education tend to display more scatter in Verbal profiles than those who failed to complete high school. An intelligence quotient that falls significantly below the average range provides an empirical indication of cognitive loss in a subject with average premorbid functioning. In such situations, the presence of intertest scatter is diagnostically extraneous. Thus, the potential diagnostic significance of scatter is of more interest in the context of normal (average) intelligence (Mittenberg, Hammeke, Rao, 1989). Given that Verbal IQ is within the average range, as the degree of dementia increases, indicated by a lower DRS score, so too will Verbal IQ.

Statement of Significance

The WAIS-R-NI has recently been developed and made available for those with a proficiency in neuropsychological assessment and research. Although this instrument is currently in circulation as a screening tool, little is known about the usefulness and accuracy of the WAIS-R-NI's modified subtests as well as a proposed "finer analysis" of subtest scatter. The literature attributes much scatter to adults with brain damage, depression and Alzheimer-type dementia. Yet, data on normal subtest scatter for the WAIS or the WAIS-R have not been available to provide a normal base rate for comparison to samples of adults with brain lesions, dementia or psychiatric disorders (McLean et al., 1989). Thus, the validity of the WAIS-R-NI is of primary importance since invalid scores in practice can have negative consequences.

Definitions

There is much uncertainty as to the exact definition of dementia and primary degenerative senile dementia of the Alzheimer type (SDAT). The literature draws attention to this uncertainty in the diagnosis of dementia, suggesting that greater precision in diagnosis could be achieved. Evidence has suggested that age may be the only difference between classic Alzheimer's disease and senile dementia, yet the trend has been to refer to both as Alzheimer's Disease (DeBoni & Crapper McLachlan, 1980). Since it is not universally accepted that both diseases be combined, these terms have become ambiguous. People diagnosed with SDAT often meet the criteria set forth by the Diagnostic and Statistical Manual Third Edition-Revised (American Psychiatric Association, 1987). This manual lists the diagnostic criteria for primary degenerative dementia of the Alzheimer type as:

- A. Demonstrable evidence of impairment in short- and long-term memory
- B. Impairment in at least one of the following:
 - (1) impairment in abstract thinking, as indicated by inability to find similarities and differences between related words, difficulty in defining words and concepts, and other similar tasks
 - (2) impaired judgment, as indicated by inability to make reasonable plans to deal with interpersonal, family, and job-related problems and issues
 - (3) other disturbances of higher cortical function, such as aphasia (disorders of language), apraxia (inability to carry out motor activities despite intact comprehension and motor function), agnosia (failure to

recognize or identify objects despite intact sensory function), and constructional difficulty (e.g., inability to copy three-dimensional figures, assemble blocks, or arrange sticks in specific designs)

(4) personality change, i.e., alteration or accentuation of premorbid traits

- C. The disturbance in A and B significantly interferes with work or usual social activities or relationships with others
- D. Not occurring exclusively during the course of delirium
- E. Insidious onset with a generally progressive deteriorating course
- F. Exclusion of all other specific causes of dementia by history physical examination, and laboratory tests (p. 121).

For purposes of this study, participants previously diagnosed with dementia will meet all of the above criteria as indicated by a previous medical diagnosis and confirmed by a records review.

Literature Review

The diagnosis of Alzheimer type dementia includes deficits in two or more areas of cognitive function (McKahann et al., 1984). Since the impairment of memory is most frequently associated with this taxing disorder, more evidence is warranted to familiarize family members, professionals and the public of other vulnerable faculties. Among the difficulties with memory, people with dementia often have impaired language and visuospatial skills. Past research does not appear to agree with regard to what processes are affected at different stages. However, some studies have suggested that attentional deficits do not emerge until later in the course of the disease (Vitaliano, Breen, Albert, Russo, & Prinz, 1984a), even though other studies (Loring & Lergen, 1985) suggest that when age and education are controlled, attention can be

affected in early-onset dementia. Regardless of when the disease does take effect, people with dementia are compromised with their attentional abilities in both strategy and available cognitive resources (Cossa, Della Sala, & Spinnler, 1989).

Numerous attempts have been made over a 40-year period to develop diagnostic procedures based on Wechsler subtest score patterns. The WAIS-R-NI recently developed by Kaplan et al. (1991) was designed to provide information useful as part of a comprehensive psychological evaluation, neuropsychological evaluation, or as an initial screening to determine the need for a more complete assessment. Until recently, people with known or suspected brain dysfunction were usually administered a battery of tests, most commonly, the Halstead Reitan Neuropsychological Test Battery and Allied Procedures or the Luria Nebraska Neuropsychological Battery (Kaufman, 1990). These tests will continue to provide extensive and valuable information with regard to brain impairment; however, newly designed instruments such as the WAIS-R-NI may offer new insight into cognitive functioning and treatment development. This instrument was designed for two types of users. The first is for the trained and qualified neuropsychologist who administers the WAIS-R as part of a comprehensive battery to assess an examinee's responses for signs of neuropsychological dysfunction. The second is to serve as a screening device to alert those trained in the use of the WAIS-R but not professionally qualified to practice clinical neuropsychology to the possibility of neurological involvement (Kaplan et al., 1991). The WAIS-R-NI is similar to its predecessor, the WAIS-R, containing all 11 of the original subtests with 3 additional subtests: Spatial Span, Sentence Arrangement, and Symbol Copy. Four of the original

subtests, Information, Similarities, Vocabulary, and Comprehension, have been modified with a Multiple Choice section to tap cognitive functions not assessed with the WAIS-R. Additionally, the Arithmetic and Digit Symbol subtests have been modified for use on the WAIS-R-NI. Collectively, this instrument consists of 14 subtests, 6 Verbal and 5 Performance, with 3 newly designed subtests not figured into Verbal and Performance scaled scores. These subtests are designed to measure different areas of mental abilities using a variety of methods.

The Verbal scale of the WAIS-R-NI is composed of the Information, Digit Span, Vocabulary, Arithmetic, Comprehension, and Similarities subtests. A summary of these scales follows. The Information subtest requires the subject to answer questions dealing with information that has not specifically been taught in a formal manner. Digit Span involves the subject's ability to repeat numbers in increasingly larger groupings, both forward and backward; it measures memory, concentration, and sequential processing abilities. Vocabulary requires the subject to define the words presented both visually and orally; it provides information concerning accumulated verbal ability, as well as insight into the thought processes. Arithmetic is an orally presented subtest that evaluates numerical reasoning and the speed of numerical manipulation. This subtest has been modified with a stimulus booklet, stimulus booklet with paper, and a response booklet with a computational option. Comprehension measures common sense, the ability to evaluate past experiences, and judgment in practical (social) situations. Similarities requires the subject to tell how two different things are alike; it is a measure of verbal abstract conceptual thinking and the extent to which the

individual can modify his or her thinking in terms of rigidity and flexibility.

The Performance Scale consists of the Picture Completion, Picture Arrangement, Block Design, Object Assembly, and Digit Symbol subtests.

Picture Completion is a measure of awareness of environmental details, concentration, and visual conceptual ability. Picture Arrangement evaluates grasp of sequence, social planning and judgment, and ability to comprehend a total situation. Block Design is a measure of manipulative and perceptual organization, and capacity for sustained effort. Object Assembly evaluates the ability to differentiate familiar configurations, to perceive relationships of unknown objects, and manipulative and perceptual speed. Digit Symbol involves copying marks from a code in the appropriate places; it is a measure of memory and retrieval of information, as well as attention span and distractibility. This subtest has been modified with a simplified Digit Symbol format and a Free Recall section.

The three newly developed subtests for the WAIS-R-NI include the Sentence Arrangement, Spatial Span and Symbol Copy tasks. The Sentence Arrangement section was designed to provide a verbal analogue to Picture Arrangement so that sequencing ability for verbal versus pictorial material could be compared. It is also for purposes of evaluating the capacity of patients with prefrontal brain damage to manipulate information in a flexible manner, to appreciate multiple meanings a word may have, and to avoid being “captured” by common sequences (Shallice, 1982; Stuss & Benson, 1986). The Spatial-Span subtest provides a visual analogue to Digit Span. This 10-cube board features an equal number of cubes randomly fixed to each half of the board. This subtest was designed to examine subjects for a preponderance in the left or right visual half field and in each quadrant of space, providing further

evidence for asymmetrical dysfunction. The Symbol Copy subtest assesses perceptual and graphomotor speed, allowing examination of their effects on Digit Symbol performance (Kaplan et al., 1991). All subtests are divided into Verbal and Performance categories (excluding the three new subtests) in order to calculate an overall or Full Scale Score.

One interpretational approach, intersubtest scatter, assesses a pattern of failures and successes across WAIS-R subtests (Wechsler, 1958). This method of interpretation is utilized as a more systematic analyses in the WAIS-R-NI. Because subtest item order is determined by "normative" difficulty, most normal examinees will give correct responses for easy items, partially correct responses for more difficult ones, and incorrect responses for the most difficult items. Deviation from this expected pattern of transition points is frequently seen in people with central nervous system dysfunction. A significant degree of scatter in the pattern of correct and incorrect responses should alert one to the possibility of difficulty with specific item content or of a variable level of arousal or attention (Wechsler, 1981). The 1955 Wechsler Adult Intelligence Scale (WAIS) and its 1981 version, the Wechsler Adult Intelligence Scale - Revised (WAIS-R) were primarily designed to measure a range of intellectual functioning. However, research supports the case of intellectual decline with increasing age. Horn (1985) reported support for a decline throughout adulthood in intelligence, estimating 5 IQ points per decade when compared with similar age group norms, with the largest loss occurring between the ages 30 and 60 years, the cause may be neurological. An exception is Kaufman's 1990 conclusions that fluid abilities do decline more rapidly with age than crystallized abilities (which continue to grow well into middle age), but that the declines begin far later in life than was formerly believed. Wechsler subtest

patterns observed in normal aging are extremely similar to the patterns observed in patients with damage to the right cerebral hemisphere, but there is little neuroanatomic support for right hemisphere dysfunction with the elderly population (Schaie & Schaie, 1977). In light of such hypothesized age changes, it seems extremely difficult to determine whether an intelligence decline is due more to neurological dysfunction or to noncognitive variables that may characterize elderly people.

Selz and Reitan (1979) proposed a scatter index for use with the Wechsler batteries that is closely related to the scaled-score range method. They suggested computing the Full Scale range by subtracting the lowest from the highest scaled score and then dividing this range by the person's mean scaled score across all subtests. Values falling above 1.76 were considered definitive of "brain damage." Kaufman (1990) indicated that these scores may be typical for adolescents and adults of low occupational status, limited education, and/or low IQ, thereby suggesting the need for more sensitive instruments specific to identifying brain impairment.

Further investigation into defining valid WAIS-R-NI measures of cognitive decline in such disorders as dementia is warranted by a lack of published information. Although previous research utilizing the WAIS and WAIS-R as neuropsychological tools is compelling, their primary design was not solely for purposes of neuropsychological evaluation. Some researchers believe that the concept of IQ be abandoned completely due to its poor ability to distinguish between brain damage and impairment (Lezak, 1988). Empirical evidence on the utility of newly developed instruments should include statistical information on normal base rates for comparison to samples of adults with brain impairment. This information would allow examiners to offer the most useful

and accurate measures for diagnostic assessment.

The recognition that Senile Dementia of the Alzheimer's Type (SDAT) is a progressive, degenerative, age-related disease which impairs memory and cognitive function and eventually the ability for self-care has sparked alternative approaches in assessing these declines. The Fuld profile (Fuld, 1983, 1984) has generated a growing amount of interest with a WAIS/WAIS-R profile that is believed to be characteristic of adults with Alzheimer's-type dementia. This profile reported that an estimated 50% of dementia patients, compared to less than 1% of normal elderly adults, displayed the characteristics of the Fuld profile. The profile makes use of only seven WAIS-R subtests including the Information, Vocabulary, Similarities, Digit Span, Digit Symbol, Block Design, and Object Assembly eliminating the four tasks which are most likely to result in visual acuity difficulties and reflect cultural bias (Fuld, 1984). Previous related research concerning Fuld profiles between SDAT patients and other types of dementia indicates a strong validity. However, contrasting research reported by Filley, Kobayashi, and Heaton (1987) observed the Fuld profile in only 1 of 42 normal controls (mean age=62), suggesting confirmatory rare occurrences in the population. It is suggested that the subjects in Filley et al.'s study may have been less impaired than the SDAT patients in prior studies, thus making Filley's study difficult to explain.

CHAPTER 2

Method

Participants

The data for this study were obtained from 15 nursing home residents, 2 males and 13 females, and 15 senior citizen center volunteers, 5 males and 10 females. All subjects ranged from 65 to 85 in age ($M = 74.3$; $SD = 12.02$). Participants were obtained on a volunteer basis and were divided equally into two separate groups. The first group consisted of adults with a medical diagnosis of Senile Dementia of the Alzheimer Type (SDAT) living in nursing homes. A second subject group, without a medical diagnosis of dementia and living independently, served as a control. Individuals with known brain damage, severe emotional or behavioral disturbance, physical handicaps that would interfere with response to test items, or those institutionalized for mental deficiency were not included in the sample.

Instrumentation

Two measuring instruments were used in this study. The first tool was the Verbal subtests of the Wechsler Adult Intelligence Scale-Revised - Neuropsychological Instrument (WAIS-R-NI). The Verbal Scale is comprised of six subtests, Information Multiple Choice, Digit Span, Vocabulary Multiple Choice, Comprehension Multiple Choice, Arithmetic Stimulus Book, and Similarities Multiple Choice. These subtests were used to indicate whether cognitive decline (dementia) existed as measured by a Verbal scaled score "range". The WAIS-R-NI, when given in its entirety, takes approximately two hours to administer. However, in this study only the Verbal portion of this instrument was used. This screening instrument was designed to assess cognitive decline with a purpose of providing information to aid in identifying

problem-solving strategies and particular cognitive deficits derived through subtest scores. The WAIS-R-NI was designed to be used in conjunction with the WAIS-R's 11 subtests, noting that a multiple-choice option is integrated into the Vocabulary, Comprehension, Similarities and Information subtests in an effort to lower the floor effects. These were recorded on a standardized WAIS-R-NI record form from which Verbal IQs were computed.

A second tool, the Mattis Dementia Rating Scale (DRS) (Mattis, 1988), consists of 36 tasks, comprising five subscales, and is a comprehensive screening device commonly used in identifying stages of dementia. The five subscales for this instrument were developed to represent the content areas of attention, perseveration, construction, conceptualization, and memory. Validity studies on the DRS have shown a strong relationship with the Wechsler Adult Intelligence Scale FSIQ in Alzheimer-type dementia populations, indicating that WAIS FSIQ decreases as the level of dementia increases (Mattis, 1976). For this study, only the Initiation/Perseveration subtest was used, which required approximately 15 minutes to administer. Normative data for the DRS were based on 85 normal elderly participants with recommended cutoff points representative of two standard deviations below the mean. Research on the DRS subscales (Vitaliano et al., 1984b) indicates that the Initiation/Perseveration subtest, composed of 11 tasks, does differentiate between normal controls and subjects with mild dementia. This subtest provides a measure of the subject's ability to begin, switch, and end a specific activity with fluency and without perseveration (Mattis, 1988) assessed through verbal inquiry. The one subtest from the DRS was administered in order to calculate a raw-score. A raw-score range of 1 to 37 is possible for this subtest. Subsequently, a raw-score cut off of 29 or more was indicative of a high score

(non-dementia), while a raw-score of 28 or less indicated a low score (dementia).

Procedures

A standardized inquiry for research was proposed to administrators from two nursing homes and a local Senior Citizen Center (See Appendix A). Facilities that agreed to participate orally authorized the examiner to begin. All control (non-dementia) subjects were obtained from a Senior Citizen Center, while the clinical (dementia) subjects were obtained from two nursing homes. Nursing home staff selected potential legally competent candidates who fit the diagnostic criteria of dementia. All participants were considered legally able to give consent as participants for human research before being approached by the examiner while those considered legally incompetent were excluded. Candidate participants were approached by the examiner to determine if they wished to participate. Those who volunteered were required to sign an informed consent form prior to testing whereby the subject's right to withdraw from the study and confidentiality issues were explained (see Appendix B). Prior to testing, instructions and procedures were explained (see Appendix C). Subsequently, demographic information was obtained (see Appendix D). All subjects were tested in a small room with a table and two chairs set aside for testing.

The Verbal portion of the WAIS-R-NI and one subtest from the DRS (Initiation/Perseveration) were administered to each participant individually with the DRS consistently given as a first order test. The Verbal section of the WAIS-R-NI has six subtests: Information Multiple Choice, Vocabulary Multiple Choice, Arithmetic with Stimulus Booklet, Comprehension Multiple Choice, Similarities Multiple Choice, and Digit Span. A Verbal IQ and scaled score range were

derived for each subject. All tests were administered and scored by the author. Each testing session took place between 9:00 a.m. and 4:00 p.m., at which participants were more likely to be at a heightened level of attention. In an effort to minimize examiner error in scoring, all scores were reviewed by another individual whose training, course work, and experience with these instruments approximate that of the author. The WAIS-R-NI Performance subtests were not utilized since the available literature suggests that interpretable scatter does not occur on these tasks (Mittenberg et al., 1989). Since time of day typically affects alertness, all subjects were tested within the same time frame to ensure for a heightened level of attention. Hoffman and Nelson (1988) asserted that the tests of choice for a given elderly subject may depend in part on administration time, as well as questions of test validity and reliability.

A subtest scaled score range was obtained from the six WAIS-R-NI Verbal subtests. The range index was computed by taking the highest subtest scaled score minus the lowest subtest scaled score. This index previously has been shown to be a pathognomonic sign of diffuse cerebral pathology (Mittenberg et al., 1989). Once the subtest scores were recorded, a systematic measurement of intrasubtest scatter was determined using the range statistic. These analyses were necessary for comparing expected levels of dementia and nondementia in subjects to observed test score classifications. It is noted that this method of scoring was also used to analyze the variability of subtest scores (scatter) in the original WAIS-R standardization sample (1880 subjects) for 8 of the 11 subtests (Wechsler, 1981).

Statistical Design

The purposes of this study were to examine the relationship between the WAIS-R-NI Verbal scaled score ranges and DRS (Initiation/Perseveration) subtests and to examine the validity of the two instruments in classifying dementia. Six scaled scores were computed from the Verbal portion of the WAIS-R-NI from which a "range" (highest scaled score minus lowest scaled score) was calculated. A scaled score range of 8 points is needed to be considered abnormal at a less than 10% chance of occurrence in a normal population (McLean et al., 1989). A range score of 0 to 16 was possible, with a score of 8 or more points being indicative of dementia while a score of 7 or less being indicative of non-dementia. Verbal subtest scaled score ranges were required to exceed 8 points or more to be considered high, while scaled score ranges of 7 or less were considered low. One subtest from the DRS was administered in order to determine a classification of dementia or non-dementia obtained by a WAIS-R-NI and DRS raw-score. Raw scores ranged from 1 to 37 for this subtest with a cut off of 29 or more indicative of a high score (non-dementia), while a raw-score of 28 or less indicative of a low score (dementia).

Two 2 X 2 chi square tests of independence (Garrett & Woodworth, 1960) were applied to determine if the expected test scores corresponded with the observed scores on the WAIS-R-NI and DRS for both levels of Group (dementia, non-dementia). A separate chi square analysis was computed for each test to compare test score classifications (dementia, non-dementia) to actual medical diagnoses of dementia or non-dementia.

All DRS raw scores and WAIS-R-NI Verbal scaled score ranges were correlated with WAIS-R-NI Verbal IQ scores for each individual to determine the degree to which a relationship existed. A Pearson product moment correlation,

the most commonly used method of measuring strength of relationships between two continuous variables (Shavelson, 1988), was calculated to determine this relationship.

CHAPTER 3

Results

The chi square test of independence was used to test the null hypothesis: There will be no statistical evidence indicating the usefulness of the Wechsler Adult Intelligence Scale - Revised - Neuropsychological Instrument (WAIS-R-NI) Verbal scaled score range, or the Dementia Rating Scale (DRS) Initiation/Perseveration subtest as valid screening tools in the detection of dementia. Otherwise stated, there will be no significant difference between the test scores of those subjects diagnosed with dementia and the test scores of those without dementia on either the WAIS-R-NI or the DRS.

On the basis of the chi square test of independence (Garrett & Woodworth, 1960), no significant difference at the .05 level was found between dementia and non-dementia subjects when using the WAIS-R-NI Verbal scaled score range X^2 (df, 1, n = 15) = 1.12, $p < .05$. However, when using the DRS Initiation/Perseveration subtest, a significant difference at the .05 level was found between medically diagnosed dementia and non-dementia subjects X^2 (df, 1, n = 15) = 4.78, $p < .05$. The WAIS-R-NI correctly identified all of those subjects within the non-dementia (control) group, and incorrectly identified a majority of the diagnosed dementia subjects as normal. The DRS correctly identified all subjects for both the dementia and non-dementia groups.

Descriptive statistics were computed on the data collected for this study. The mean scores, standard deviations, and ranges obtained from the two sample groups for the DRS and WAIS-R-NI are shown in Table 1. The WAIS-R-NI correctly identified 13% of the medically diagnosed dementia subjects. Verbal IQ for the dementia group was represented by a mean of 84.4 with a

range of 98 to 72. The Verbal scaled score range indicated a mean of 4.4 with a range of 10 to 2. For the non-dementia subjects, 100% of the group was correctly identified using the WAIS-R-III Verbal scaled score range. Verbal IQ for the non-dementia group reported a mean of 105.26 with a range of 94 to 117. The Verbal scaled score range indicated a mean of 5 with a range of 2 to 7.

When using the DRS Initiation/Perseveration subtest to classify the presence of dementia, 100% of the medically diagnosed dementia subjects were correctly identified. Verbal IQ for this group indicated a mean of 84.4 with a range of 71 to 98. The DRS indicated a raw score mean of 14.73 with raw scores ranging from 8 to 22 for the diagnosed dementia group. Subsequently, 100% of the non-dementia subjects were correctly identified using the DRS subtest. A Verbal IQ mean of 105.26 with a range of 91 to 117 were also indicated for this group. Raw scores on the DRS for the non-dementia group indicated a mean of 35.20 with a raw score range of 31 to 37.

Table 1

Descriptive Statistics for the DRS, WAIS-R-NI scaled score ranges and WAIS-R-NI Verbal IQ scores for Medically Diagnosed Dementia and Non-dementia

Test	<u>M</u>	<u>SD</u>	<u>Range</u>
DRS raw score			
Diagnosed Dementia	14.73	3.61	8-22
Non-dementia (Control)	35.20	2.70	30-37
WAIS-R-NI scale score difference			
Diagnosed Dementia	4.40	5.03	2-10
Non-dementia (Control)	5.00	5.41	3-7
WAIS-R-NI Verbal IQ			
Diagnosed Dementia	84.40	1.33	72-98
Non-dementia (Control)	105.26	0.33	91-117

N = 30

Note. DRS = Dementia Rating Scale, WAIS-R-NI = Wechsler Adult Intelligence Scale- Revised-Neuropsychological Instrument.

The relationship between test scores was determined by using the Pearson product-moment correlation technique. These correlations are presented in Table 2. It was previously suggested that as scores increase on the WAIS-R-NI scaled score range and as scores decrease on the DRS, evidence of dementia would be indicated. A correlational analysis of each test with Verbal IQ was examined with a $p < .05$ level of significance.

Table 2

Correlations of DRS raw scores and WAIS-R-NI Scaled Score Ranges each with Verbal IQ for Medically Diagnosed Dementia and Non-dementia Groups

Group	Tests	r
Dementia	DRS - WAIS-R-NI VIQ	.15
	WAIS-R-NI ssr - WAIS-R-NI VIQ	.41
Non-Dementia	DRS - WAIS-R-NI VIQ	-.06
	WAIS-R-NI ssr - WAIS-R-NI VIQ	.33

Note: No values were significant

CHAPTER 4

Discussion

The present study examined the effectiveness of one subtest from the Dementia Rating Scale (DRS) and the Verbal portion of the Wechsler Adult Intelligence Scale-Revised-Neuropsychological Instrument in classifying dementia. Using two separate chi square analyses, two groups of subjects, diagnosed dementia and non-dementia, were compared to their corresponding test scores. All subjects were analyzed together for each chi square. The first analysis between subject groups was calculated for the DRS while a second was done for the WAIS-R-NI. Additionally, Verbal IQ for each subject group was correlated to test scores to determine the degree of relationship.

When using the WAIS-R-NI and the DRS as screening instruments for detecting dementia, significant differences were found between the two tests for both the clinical and control groups. It was determined that the DRS Initiation/Perseveration subtest indicated perfect identification of all subjects. These results strongly suggest its effectiveness as a tool in identifying cognitive decline and whether a more thorough follow up is needed. The WAIS-R-NI scaled score range was less accurate in classifying dementia. It is noted that such results are only representative of the scaled score range procedure used in this study and may not be generalizable to the WAIS-R-NI test itself.

The results of this study indicate 100% of the participants previously medically diagnosed with dementia were correctly identified using the DRS. This same percentage was found for the non-dementia subjects using the DRS. However, when using the WAIS-R-NI scaled score range, only 13% of the medically diagnosed subjects were correctly identified, leaving 87% of this group being incorrectly identified. For the non-dementia group, 100% of the

subjects were correctly identified using the WAIS-R-NI scaled score range, which may have been due to higher functioning subjects within the non-dementia group as indicated by higher IQs .

When using the DRS to detect dementia, no significant differences were found between test scores of medically diagnosed dementia and non-dementia groups. The WAIS-R-NI scaled score range procedure indicated a significant difference between test scores of previously medically diagnosed dementia and non-dementia subjects. The results indicated that the DRS may be more effective than the WAIS-R-NI in screening for dementia and in suggesting the need for a more comprehensive examination. This does not suggest that a single subtest from the DRS be used solely for diagnostic purposes.

It is noted that caution should be used when generalizing from results of a small sample. Additionally, the unequal number of males and females resulted in a significantly larger sample of females in both the dementia and non-dementia groups. The larger sample may be indicative of decreased longevity with regard to the life expectancy of males, therefore increasing the availability of females in this age group. This gender difference resulted in a 3 to 1 ratio of females over males.

Future attempts in replicating this study may produce more generalizable results when using alternative methods for classifying dementia with the WAIS-R-NI. The scaled score range, with a recommended cutoff, was used, and may have affected WAIS-R-NI's ability to detect dementia. Although the scaled score difference method was ineffective for classifying dementia subjects, previous WAIS-R research supported the approach.

The relationship between test scores for both groups demonstrated no significance. However, the WAIS-R-NI produced higher positive correlations

than the DRS. Future research is suggested to substantiate those scores which approached significance. Such research may provide information about how intelligence is affected by different stages of cognitive deficiency among males and females.

REFERENCES

- American Psychiatric Association. (1994). Diagnostic and statistical manual of mental disorders (4th ed.). Washington, D.C.: author.
- Brink, T. L., Yesavage, J. A., Lum, O., Heirsema, P., Adey, N., & Rose, T. L. (1982). Screening tests for geriatric depression. Clinical Gerontologist, 1, 37-43.
- Cossa, M., Della Sala, S., & Spinnler, H. (1989). Selective visual attention in Alzheimer's and Parkinson's patients: Memory and data-driven control. Neuropsychologia, 27, 887-892.
- DeBoni, U., & Crapper McLachlan, D.R. (1980). Senile dementia and Alzheimer's disease: A current view. Life Sciences, 7, 1-14.
- Downie, N. M., & Heath, R. W. (1983). Basic statistical methods (5th ed.). New York: Harper & Row.
- Filley, C. M., Kobayashi, J., & Heaton, R. K. (1987). Wechsler intelligence scale profiles, the cholinergic system, and Alzheimer's disease. Journal of Clinical and Experimental Neuropsychology, 9, 180-186.
- Fuld, P. A. (1984). Test profile of cholinergic dysfunction and of Alzheimer-type dementia. Journal of Clinical Neuropsychology, 6, 380-392.
- Garrett, H. E., & Woodworth, R. S. (1960). Statistics in psychology and education. New York: Longmans, Green, and Co.
- Hoffman, R. G., and Nelson, K. S. (1988). Cross validation of six short forms of the WAIS-R in a healthy geriatric sample. Journal of Clinical Psychology, 44, 952-957.

- Horn, J. L. (1985). Remodeling old models of intelligence. Handbook of intelligence. New York: Wiley.
- Kaplan, E., Fein, D., Morris, R., and Delis, D. C. (1991). Manual for the Wechsler Adult Intelligence Scale-Revised as a Neuropsychological Instrument. New York: The Psychological Corporation.
- Kaufman, A.S. (1990). Assessing adolescent and adult intelligence. Boston: Allyn, Bacon and Co.
- Lezak, M.D. (1988). The last but hardly final word on the issue. NASP Communique, 17, 6.
- Loring, D., & Lergen, J. (1985). Neuropsychological patterns of presenile and senile dementia of the Alzheimer type. Neuropsychologia, 23, 351-357.
- Mattis, S. (1976). Mental status examination for organic mental syndrome in the elderly patient. New York: Grune, Stratton, and Co.
- Mattis, S. (1988). Dementia Rating Scale professional manual. Odessa, FL: Psychological Assessment Resources.
- McKahann, G., Drachman, D., Folstein, M., Katzman, R., Price, D., & Stadlan, E. (1984). Clinical diagnosis of Alzheimer's disease: Report of the NINCDS-ADRDA work group under the auspices of Department of Health and Human Services Task Force on Alzheimer's Disease. Neurology, 34, 939-944.
- McLean, J. E., Kaufman, A. S., & Reynolds, C. R. (1989). Base rates of WAIS-R subtest scatter as a guide for clinical and neuropsychological assessment. Journal of Clinical Psychology, 45, 919-926.

Mittenberg, W., Hammeke, T. A., & Rao, S. M. (1989). Intrasubtest scatter on the WAIS-R as a pathognomonic sign of brain injury.

Psychological Assessment: A Journal of Consulting and Clinical Psychology, 1, 273-276.

Schaie, K. W., & Schaie, J. P. (1977). Clinical assessment and aging. Handbook of the psychology of aging. New York: Van Nostrand and Reinhold.

Selz, M., & Reitan, R. M. (1979). Rules for neuropsychological diagnosis: Classification of brain function in older children. Journal of Consulting and Clinical Psychology, 47, 258-264.

Shallice, T. (1982). Specific impairment of planning. In D. E. Broadbent & L. Weiskrantz (Eds.), The neuropsychology of cognitive function (pp. 199-209). London: The Royal Society.

Shavelson, R. J. (1988). Statistical reasoning for behavioral sciences. Boston: Allyn and Bacon.

Stuss, D. T., & Benson, D. F. (1986). The frontal lobes. New York: Raven Press.

Vitaliano, P.P., Breen, A. R., Albert, M. S., Russo, J., & Prinz, P. N. (1984a). Memory, attention, and functional status in community residing Alzheimer Type dementia patients and optimally healthy aged individuals. Journal of Gerontology, 39, 58-64.

Vitaliano, P. P., Breen, A. R., Russo, J., Albert, M., Vitiello, M., & Prinz, P.N. (1984b). The clinical utility of the Dementia Rating Scale for assessing Alzheimer patients. Journal of Chronic Disabilities, 37, 743-753.

Wechsler, D. (1958). The measurement and appraisal of adult intelligence (4th ed.). Baltimore: Williams & Wilkens.

Wechsler, D. (1981). Wechsler Adult Intelligence Scale-Revised. San Antonio, TX: The Psychological Corporation.

APPENDICES

APPENDIX A
NURSING FACILITY/SENIOR CENTER TELEPHONE INQUIRY FOR
RESEARCH

APPENDIX A**NURSING FACILITY / SENIOR CENTER INQUIRY FOR RESEARCH**

My name is Reg Ayres, I am a graduate student in clinical psychology at Emporia State University. I am calling to inquire about the possible use of your facility and selected residents to participate in a research study as partial requirements for my masters thesis. My study will examine how well certain tests detect dementia in elderly people. I would be interested in scheduling a time to visit with you in person to discuss the possibilities for doing some research at your facility and implications which may benefit the aging community.

APPENDIX B
INFORMED CONSENT

APPENDIX B
INFORMED CONSENT

Participant Name: _____

Project Name: A Comparison of Selected Subtest Scores On The Wechsler Adult Intelligence Scale-Revised-Neuropsychological Instrument (WAIS-R-NI) And The Dementia Rating Scale (DRS) In Classifying Dementia.

Examiner: Reg Alan Ayres

I hereby consent to be a participant in the research project named above. I also understand that my legal/family representative has authorized my participation in this study. An explanation of the study was provided to me and I was assured that any inquiries concerning the procedures and/or investigation would be answered once the project is completed per request. I was reassured and understand that I am free to withdraw my consent and to discontinue participation in the project or activity at any time. All information gathered in the course of the study will be kept confidential.

Participant: _____

Date: _____

Examiner: _____

1533 Merchant, Apt. E-2, Emporia, KS.
316-342-1186

Date: _____

APPENDIX C
TESTING INSTRUCTIONS

APPENDIX C

TESTING INSTRUCTIONS

You will be taking selected portions of the Wechsler Adult Intelligence Scale-Revised-Neuropsychological Instrument and the Dementia Rating Scale. This will consist of a number of exercises comprised of a variety of items; in some cases I will ask you several questions. In many instances I must write down your responses. Some of the items will be timed; however, the time limits are quite liberal. These exercises are designed for adults from the ages 16 on up; therefore, some of the questions will be quite easy, and others may seem quite hard. The main thing is that you do your very best. If you have any questions during these exercises, please ask; however, I am not allowed to tell you if you are wrong or right. Do you have any questions before we begin?

APPENDIX D
DEMOGRAPHIC QUESTIONNAIRE

APPENDIX D

DEMOGRAPHIC QUESTIONNAIRE

DATE:_____

AGE:_____

EDUCATION:_____

CURRENT DEFICITS: ___HEARING ___VISION ___MOTOR
___OTHER

CURRENT MEDICATIONS WHICH MAY AFFECT

TESTING:_____

TO: All Graduate Students Who Submit a Thesis or Research Problem/Project as Partial Fulfillment of the Requirements for an Advanced Degree

FROM: Emporia State University Graduate School

I, REG ALAN AYRES, hereby submit this thesis to Emporia State University as partial fulfillment of the requirements for an advanced degree. I agree that the Library of the University may make it available for use in accordance with its regulations governing materials of this type. I further agree that quoting, photocopying, or other reproduction of this document is allowed for private study, scholarship (including teaching) and research purposes of a nonprofit nature. No copying which involves potential financial gain will be allowed without written permission of the author.

Reg Alan Ayres
Signature of Author

11-15-94
Date

A COMPARISON OF SELECTED SUBTEST SCORES ON THE WECHSLER ADULT INTELLIGENCE SCALE-REVISED NEUROPSYCHOLOGICAL INSTRUMENT (WAIS-R-NI) AND DEMENTIA RATING SCALE (DRS) CLASSIFYING DEMENTIA.
Title of Thesis

Sally Cooper
Signature of Graduate Office Staff Member

11-22-94
Date Received