

**THE ANALYSIS OF COGNITIVE FUNCTIONING OF
PSYCHIATRIC INPATIENTS USING THE WAIS-R:
IMPLICATIONS FOR DIFFERENTIAL DIAGNOSIS**

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An Abstract
Presented to
the Graduate Council of
Austin Peay State University

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts

by
James Stephen Ellis

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ABSTRACT

The feasibility of using the WAIS-R to assist in differential diagnosis was investigated using a sample of 81 psychiatric inpatients. Results indicated that psychiatric inpatients function at a lower level intellectually than do normal persons. In addition, there was no differentiation of intellectual functioning in schizophrenics on the basis of age, and an attempt to differentiate diagnoses on the basis of cognitive ability resulted in the differentiation of patients diagnosed as Adjustment Disorder from those diagnosed as Schizophrenia, Paranoid Type, Mild Mental Retardation and Schizophrenia, Undifferentiated Type. It is concluded that more research with psychiatric inpatients, using additional variables having effects on intellectual functioning, would be beneficial in providing more information for differential diagnosis.

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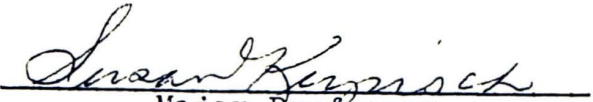
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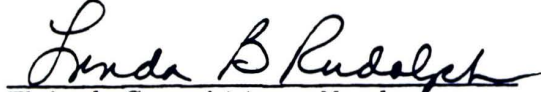
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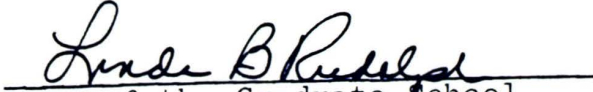
I am submitting herewith a Thesis written by James Stephen Ellis entitled "The Analysis of Cognitive Functioning of Psychiatric Inpatients using the WAIS-R: Implications for Differential Diagnosis." I recommend that it be accepted in partial fulfillment of the requirement for the degree of Master of Arts, with a major in Psychology.


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TABLE OF CONTENTS

	PAGE
LIST OF TABLES	vii
CHAPTER	
1. INTRODUCTION	1
Review of the Literature	3
2. METHODOLOGY	9
Subjects	9
Procedure	9
Instrumentation	9
3. RESULTS	11
4. DISCUSSION	14
REFERENCES	19
APPENDIX	32

LIST OF TABLES

TABLE

PAGE

1. Table of VIQ, PIQ, and FSIQ Means by Diagnostic Category	24
2. Table of VIQ, PIQ, and FSIQ Means by Age Group for Schizophrenic Patients	25
3. Analysis of Variance for Effects of Diagnostic Grouping on VIQ	26
4. Analysis of Variance for Effects of Diagnostic Grouping on PIQ	27
5. Analysis of Variance for Effects of Diagnostic Grouping on FSIQ	28
6. Analysis of Variance for Effects of Age Grouping on VIQ for Schizophrenic Patients . .	29
7. Analysis of Variance for Effects of Age Grouping on PIQ for Schizophrenic Patients . .	30
8. Analysis of Variance for Effects of Age Grouping on FSIQ for Schizophrenic Patients	31

CHAPTER 1

Introduction

The Wechsler Adult Intelligence Scale-Revised (WAIS-R) is the most up-to-date and reliable tool for the assessment of adult intelligence (Wechsler, 1981; Ryan, Georgemiller & McKinney, 1984). As such, it is the instrument of choice for the assessment of intellectual functioning in a variety of settings.

One arena in which the WAIS-R is used is the mental hospital, whose population consists of psychiatric inpatients. According to Wechsler (1981), levels of performance on an intelligence test are most effectively defined by comparison of a subject's test score with scores obtained by peers of his or her own age. However, the normative sample excluded persons with psychiatric illness or neurological disease involving the brain (Ryan, Prifitera & Larsen, 1982). As a result, the WAIS-R scores of psychiatric inpatients are determined by comparison to a norm group which contained none of their peers. While this comparison will indicate how well a patient is functioning intellectually in comparison to the "normal" population, it gives little information to the clinician who wants to compare the level of functioning of a patient to others having the same diagnosis, or to a psychiatric inpatient

population in general. Such information would be useful to the clinician in determining the severity of a particular disorder upon admission of a patient.

Also, when symptoms could be indicative of two different disorders, the availability of a means for comparison could assist in the process of differential diagnosis. For example, the Diagnostic and Statistical Manual of Mental Disorders, Third Edition (1980), or DSM-III, gives mental retardation as a differential diagnosis for schizophrenia due to a shared tendency toward low level of social functioning, oddities of behavior, and impoverished affect and cognition for patients of both diagnoses. Since the WAIS-R is routinely used in the evaluation of psychiatric inpatients, any information that the test could provide in assisting in the differentiation of disorders would improve the efficiency of the testing procedure and remove some of the uncertainty of diagnosis.

To add to this information, comparisons between the scores of psychiatric inpatients tested with the WAIS-R and the WAIS-R standardization sample will be made in this study to determine differences in performance between the two groups. In addition, an attempt will be made to increase the applicability of the WAIS-R to the clinical population by score comparisons within and across diagnostic categories. In this way, the utility of the WAIS-R for the differentiation of psychiatric diagnoses will be investigated.

Review of the Literature

Most of the recent research using the WAIS-R and its earlier version, the WAIS, with a psychiatric population has been conducted in an effort to develop a short form that may be administered more rapidly. From this research, data have been gathered which give some indication of the level of intellectual functioning of psychiatric inpatients as a group.

In a study by Ryan, Prifitera and Larsen (1982) to determine the reliability of the WAIS-R with a sample consisting of patients having psychiatric or neurological disorders or a combination of both, a WAIS-R mean Full Scale of 93-18 was obtained for a group of 50 inpatients. Only one female patient was included in this group, and the authors suggest that additional information on the reliability of the WAIS-R with a similar sample is needed.

In an attempt to validate a short form of the WAIS, Duckro, Longstreet and McLaughlin (1982) obtained a mean Full Scale I.Q. score of 81.22 for their initial sample and 81.76 for their replication sample. In a similar study by Gibson (1981) a mean WAIS Full Scale I.Q. of 94.76 was obtained for a sample of 100 psychiatric inpatients with a variety of diagnoses. Gibson included no female patients in his sample.

Research to develop a short form of the WAIS-R (Dinning & Kraft, 1983; Ryan, Larsen & Prifitera, 1983; Ryan,

Georgemiller & McKinney, 1984) with clinical/psychiatric samples has yielded a mean Full Scale I.Q. range of 67.8 to 92.47, which is consistent with the scores gained from similar research using the WAIS.

Correlational studies using the WAIS and other measures of intellectual functioning with a psychiatric population (Watson & Klett, 1975; Watson, et al., 1981; Hart, Norman & Sergeant, 1979a, 1979b) have yielded mean WAIS Full Scale I.Q. scores ranging from 85.77 to 105. The scores at the upper end of this range approximate average scores for a normal population; however, these results may be dubious due to the sampling characteristics involved. Watson and Klett (1975) found a mean Full Scale I.Q. of 99.2, but their sample contained only one female. Watson et al. (1981) obtained a mean Full Scale I.Q. of 105, but 58 of the 100 subjects tested were diagnosed as alcohol addicted. Thus, the sample was dominated by patients of one diagnostic category.

In a study to determine the performance of 40 psychiatric inpatients (24 male, 16 female) on the WAIS, a mean Full Scale I.Q. of 89.78 was obtained, with only three persons scoring above 110 (Maloney, Nelson, Duvall & Kirkendall, 1978). A variety of diagnoses was represented in this sample.

According to Ciula and Cody (1978), most validation studies of the WAIS simply demonstrate its relationship to

other tests of intelligence, and this method may be insufficient in demonstrating a test's validity for a special setting. In their study comparing the WAIS to an observational rating scale, they obtained a mean WAIS Full Scale I.Q. score of 84.36 for a sample of 50 psychiatric inpatients with a variety of diagnoses.

A sample of 23 males drawn from a prison psychiatric hospital had a mean WAIS-R Full Scale I.Q. score of 79.4 (DeCato & Husband, 1984), while a factor analytic research study by Atkinson and Cyr (1984) resulted in a mean WAIS-R Full Scale I.Q. of 86 for a sample of 114 psychiatric hospital inpatients.

In these studies using samples of psychiatric inpatients' mean Full Scale I.Q. scores for the WAIS and WAIS-R are consistently lower than the mean of 100 for the standardization sample. This indicates a need for investigation of the difference in performance between the psychiatric and normal populations. To date there have been no published studies which attempt to determine the significance of this difference in performance.

Little research has been done in which the WAIS-R is used as an aid in differential diagnosis. Baud and Rauchfleisch (1982) used the German version of the Wechsler, the Hamburg-Wechsler Intelligence test for Adults (HAWIE) in an effort to differentiate 50 patients with cerebral dysfunctions and 50 patients with various neurotic

disturbances. In this study, an optimal differentiation between groups was possible by use of a combination of Digit Symbol, Digit Span, and Similarities subtests. There was no general factor for subjects having cerebral dysfunction.

In an attempt to differentiate schizophrenic, brain damaged, drug abuse, and non-psychotic/non-brain-damaged psychiatric patients, the WAIS was used in combination with the Halstead-Reitan Neuropsychological Battery with patients from 16-20 years of age. The results of this combination indicated that groups could generally be discriminated with accuracy rates ranging from 73-87% correct classifications (Bigler, Tucker & Piran, 1979).

Another study using the Hamburg-Wechsler (HAWIE) with a sample consisting of neurotic, depressed, schizophrenic, and brain-damaged patients found no significant difference between groups using comparison of subtests or multivariate statistical analysis. The author concluded with the recommendation that the HAWIE only be used to assess subjects' general level of intelligence tests are chiefly designed to yield I.Q.scores, it seems that to use the I.Q. score itself for assistance in differential diagnosis would be to use the strongest aspect of the test. For example, schizophrenia as conceived by Emil Kraepelin was a progressive disorder with acute or chronic onset. It emerges around the time of puberty and leads to the deterioration

of the patient. Therefore, under his system, intellectual functioning in schizophrenics decreased as age increased.

To test this hypothesis, a study by Chaikelson and Schwartzman (1983) attempted to differentiate the cognitive abilities of schizophrenic patients by age. They found no difference in intellectual functioning between younger and older schizophrenics based on WAIS I.Q. scores. However, only the Vocabulary subtest was administered, and an I.Q. score was prorated from this subtest. Further investigation is needed in this area using more complete testing procedures.

The fact that there is a lack of research which attempts to differentiate psychiatric disorders on the basis of cognitive ability indicates this area as one which merits further scrutiny. This study will attempt to determine the degree to which the intellectual functioning of a psychiatric population differs from that of the normal population generally. More specifically, an attempt to differentiate psychiatric diagnoses and to determine differences in intellectual functioning in schizophrenics, using I.Q. scores derived from the complete administration of the WAIS-R, will be made. In order to investigate these areas of concern, three hypotheses were tested:

1. There will be a significant difference in Verbal, Performance, and Full Scale I.Q. scores on the WAIS-R between a psychiatric population and the normal population as represented by the WAIS-R standardization sample.

2. There will be a significant difference in Verbal, performance, and Full Scale I.Q. scores on the WAIS-R among different DSM-III diagnostic categories in a psychiatric population.

3. There will be a significant difference in Verbal, performance, and Full Scale I.Q. scores on the WAIS-R for patients diagnosed as schizophrenic, on the basis of age.

CHAPTER 2

Methodology

Subjects

The sample consisted of psychiatric patients at Western State Mental Hospital, Hopkinsville, Kentucky, who had been tested with the WAIS-R during the years 1984 and 1985. Included were 52 males and 30 females for a total of 81 subjects. The mean age of the sample was 34.78 years, and individual ages ranged from 19 to 72 years of age. A variety of admitting diagnoses were represented.

Procedure

Data were gathered from the testing files of the Psychology Department of Western State Hospital. The data gathered included age, sex, admitting diagnosis, Verbal, Performance, and Full Scale I.Q. scores for each patient tested with the WAIS-R during the years 1984 and 1985. This time period was chosen because the WAIS was used almost exclusively for intellectual assessment at Western State prior to 1984. Permission was granted for these data to be gathered (see Appendix). After the data were gathered, post-hoc statistical analyses using the t-test for independent samples and one-way analyses of variance were performed to evaluate the research hypotheses.

Instrumentation

The instrument used to determine the level of cognitive

ability of each subject was the Wechsler Adult Intelligence Scale-Revised (WAIS-R). The WAIS-R is the 1980 revision of the WAIS, which was published in 1955. It was revised in order to provide new norms based upon a contemporaneous sample of the population (Wechsler, 1981). The norm group consisted of 1880 adult subjects between the ages of 16 and 74 inclusively, drawn from educational and occupational categories in proportions approximating their incidence in the U.S. population according to census data (Wechsler, 1981). From this norm group a subgroup of 500 people between 20 and 34 years of age was chosen. The scaled scores, into which all raw scores on the WAIS-R are converted, are based upon this "reference group" of 500 people (Wechsler, 1981). The 20-34 age group was chosen because evidence indicated that performance on most tests reaches a peak during this age period (Wechsler, 1981). The sums of the scaled scores are converted into Verbal, Performance, and Full Scale I.Q. scores for each group. These "deviation I.Q.'s" have a mean of 100 and a standard deviation of 15 for each age group, based on the performance of the standardization sample. This test is a revision of the WAIS, and as such is the most reliable measure of adult intelligence currently in use (Wechsler, 1981; Ryan, Georgemiller & McKinney, 1984).

CHAPTER 3

RESULTS

A t-test for independent samples was used to determine differences on Verbal (VIQ), Performance (PIQ), and Full Scale I.Q. (FSIQ) scores between the psychiatric sample and the WAIS-R standardization sample. Significant differences on all three measures of cognitive ability were found between the two groups. The means for the psychiatric sample were: VIQ=74.15 (SD=12.01), PIQ=72.33 (SD=12.97), and FSIQ=71.85 (SD=12.55). This is compared to a mean score of 100 and a standard deviation of 15 for the standardization sample on all three measures. For the Verbal I.Q. difference, $t(df=579)=14.61$, $p < .001$. For the difference in Performance I.Q. between the two groups $t(df=579)=15.68$, $p < .001$. The difference in Full Scale I.Q. between the psychiatric and standardization samples is represented by $t(df=579)=16.00$, $p < .001$. In all three cases, the psychiatric sample means were significantly lower than the mean scores for the standardization sample.

In order to evaluate the hypothesis of differentiation of psychiatric disorders on the basis of intellectual functioning, the four largest groups of admitting diagnoses were selected, and a one-way analysis of variance was used to determine differences between these diagnostic groups

on WAIS-R Verbal, Performance, and Full Scale I.Q. scores. These diagnostic groups were Mild Mental Retardation (N=14); Schizophrenia, Paranoid Type (N=12); Adjustment Disorder (N=8); and Schizophrenia, Undifferentiated Type (N=7). The analysis of variance indicated that diagnostic grouping served as a significant source of variability in the test scores.

On the Verbal I.Q., a post-hoc analysis of differences between means using a protected t indicated a significant difference between the Adjustment Disorder group and the Schizophrenia, Undifferentiated Type, and Mild Mental Retardation groups, $F(3, 37)=7.29$, $p=.001$. Mean Verbal I.Q. scores for the four groups were: Adjustment Disorder, 88.62; Schizophrenia, Paranoid Type, 75.00; Schizophrenia, Undifferentiated Type, 71.85; and Mild Mental Retardation, 65.42.

The post-hoc analysis for differences between groups in Performance I.Q. score indicated a significant difference between the Adjustment Disorder group and the other three groups. For the Performance I.Q. ANOVA, $F(3, 37)=9.70$, $p < .001$. Group means for Performance I.Q. were Adjustment Disorder, 91.00; Schizophrenia, Paranoid Type, 71.75; Schizophrenia, Undifferentiated Type, 69.00; and Mild Mental Retardation, 63.78.

On the Full Scale I.Q., the post-hoc analysis using the protected t indicated a significant difference between the Adjustment Disorder group and the other three groups.

On the Full Scale I.Q. ANOVA, $F(3, 37)=9.95$, $p .001$.

Group means were: Adjustment Disorder, 89.12; Schizophrenia, Paranoid Type, 72.25; Schizophrenia, Undifferentiated Type, 68.57; and Mild Mental Retardation, 62.71.

To test the hypothesis of differences in intellectual functioning on the basis of age in schizophrenic patients, the patients diagnosed as schizophrenic were placed in one of four groups on the basis of chronological age (15-25, 26-35, 36-45, 46+ years). An analysis of variance was performed to determine differences in Verbal, Performance, and Full Scale I.Q. scores on the basis of age. In each case there was no significant difference in I.Q. scores between the different age groups. However, the 46+ age group had the lowest mean score on all three measures of cognitive ability, and it was the only group whose mean I.Q. scores fell below 70: VIQ=68.66, PIQ=64.16, and FSIQ=64.66. The 36-45 group had the highest mean Verbal and Full Scale I.Q. scores (VIQ=81.00, FSIQ=77.00), while the 26-35 group had the highest mean Performance I.Q. score, 74.75

CHAPTER 4

Discussion

The significant difference in intellectual functioning found between this psychiatric inpatient sample and the WAIS-R standardization sample is consistent with the findings of previous researchers who have worked with psychiatric populations, and it is indicative of the generalized lowering of intellectual functioning common in psychiatric inpatients. This may be due to the fact that most patients in a state-supported psychiatric inpatient facility are persons of lower socio-economic status who cannot afford treatment in a private hospital or other treatment center. Typically, these people have had limited opportunities for educational and environmental stimulation, and their lowered I.Q. scores may reflect this deprivation. This raises the question of the utility of comparing these persons of lowered intellectual functioning to a standardization sample which includes no similar psychiatric subjects, and the applicability of test scores thus derived.

Since one would expect on the basis of previous psychiatric research that psychiatric inpatients would be cognitively impaired due to the nature of their disorder and lower socioeconomic status, little useful information is gained for diagnostic purposes in the I.Q. alone, it

simply validates the expectation. Since the WAIS-R is routinely administered to psychiatric patients as a part of their treatment, it would be beneficial if more information related to diagnosis could be gained from this assessment procedure.

In addition, no published research was located which compared intellectual functioning of psychiatric inpatients in state-supported facilities to psychiatric patients who are receiving treatment in private hospitals or other treatment centers. Persons whose socio-economic status allows them the option of receiving treatment in a private facility may have more education and may be functioning at a higher intellectual level than their counterparts who are being treated in state hospitals. Research using premorbid educational level and annual income, as well as type of treatment facility, could help to isolate the degree to which the lowering of intellectual functioning of psychiatric inpatients is due to a psychiatric disorder and how much is due to cultural deprivation. It may be that persons who have the same diagnosis will function at different levels based on education and income.

That the WAIS-R could differentiate patients diagnosed as Adjustment Disorder from other patients with commonly encountered psychiatric diagnoses is a step in differential diagnosis. Patients diagnosed as Adjustment Disorder were consistently higher functioning intellectually than those

diagnosed as Schizophrenia, Undifferentiated Type or Mild Mental Retardation, and on two of three measures were significantly different from the Schizophrenia, Paranoid Type group on Verbal I.Q. score. This could be due to three factors: the higher functioning on the part of the Schizophrenia, Paranoid Type group; the later onset of Schizophrenia, Paranoid Type; and the low incidence of gross disorganization with this diagnosis (APA, 1980). Knowing this information can assist the clinician in diagnosing disorders upon entry into the psychiatric facility and perhaps quicken treatment planning.

To date, most research attempting to differentiate disorders on the basis of intellectual functioning has been done in Germany; little research of this type has been conducted in this country, and it is needed. Research using larger psychiatric samples with a greater diversity of disorders may provide information which is more applicable to the psychiatric patient in the United States than that which has been gathered in other countries.

The attempt to differentiate intellectual functioning in schizophrenics on the basis of age supports the findings of Chaikelson and Schwartzman (1983) that there is no difference. It contradicts Kraepelin's theory of progressive degeneration of intellectual functioning in schizophrenic patients. However, even though there was no difference between groups, there is evidence which favors both sides

of the question. The fact that two of the three highest mean scores were attained by the 36-45 year old group would tend to support the findings of no difference, because they should have scored lower than the two younger groups, according to Kraepelin's theory. On the other side of the coin, the fact that the 46+ age group was the lowest on all three measures, and the only group whose mean scores on all three fell below 70 would tend to support Kraepelin's theory of progressive deterioration of intellectual functioning in schizophrenics. Further research in this area which includes age of onset of the disorder and duration of hospitalization as variables related to decrease intellectual functioning is necessary.

The comparison of psychiatric inpatients to the normal population may only tell the clinician what the patient cannot do. While this is important to know, it presents a one-sided view of the patient, and it yields little information about the patient's strong points. A profile of strengths and weaknesses is helpful in treatment planning and evaluation, since it provides a benchmark by which progress can be measured.

Additional information about the patient's ability to function in the environment can be obtained through the use of adaptive behavior scales. In the case of special services for handicapped youth, federal regulation 94-142 specifies that an adaptive behavior scale be administered in

conjunction with a test of cognitive abilities. Such scales give information as to current level of functioning in the environment, information which cannot be gained as accurately from an intelligence test. Since psychiatric inpatients are generally lower-functioning in comparison to the normal population, just as mentally retarded children are in comparison to normal children, the use of an adaptive behavior scale as an adjunct to intelligence testing also may be beneficial to the clinician in determining the patient's strengths as well as weaknesses.

The main thrust of this study has been to determine the efficacy of using the WAIS-R, whose administration is a routine part of treatment of psychiatric inpatients, as an aid in differential diagnosis. This is due to the dubious utility of the information derived from the prescribed use of the test for diagnosis and treatment. In these days of shrinking budgets and understaffed hospitals, the clinician has to make the most efficient use of the time spent in contact each day with patients, and any information gained from the routine administration of the WAIS-R which could have a bearing on diagnosis and treatment, as well as level of intellectual functioning, would give a greater return on the time invested in testing, and it would assist the clinician to deliver the most effective service to the patient in a hectic and sometimes frustrating venue: the state psychiatric hospital.

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TABLES

Table 1

Table of VIQ, PIQ, and FSIQ Means by Diagnostic Category

Group	N	VIQ	PIQ	FSIQ
Adjustment Disorder	8	88.62	91.00	89.12
Schizophrenia, Paranoid	12	75.00	71.75	75.25
Schizophrenia, Undifferentiated	7	71.85	69.00	68.57
Mild Mental Retardation	14	65.42	63.78	62.71

Table 2

Table of VIQ, PIQ, and FSIQ Means by Age Group for
Schizophrenic Patients

Group	N	VIQ	PIQ	FSIQ
15-25 years	6	73.50	72.33	71.83
26-35 years	4	73.75	74.75	72.00
36-45 years	4	81.00	73.50	77.00
46+ years	6	68.66	64.16	64.66

Table 3

Analysis of Variance for Effects of Diagnostic Grouping
on VIQ

Source	SS	DF	MS	F
Total	7489.12	40		
Between Groups	2782.96	3	927.65	7.29
Within Groups	4706.15	37	127.19	

Probability = .001

Significance Level = .05 $t = 2.00$

Standard Error = 7.332

Critical Difference Between Means = 14.67

Table 4

Analysis of Variance for Effects of Diagnostic Grouping
on PIQ

Source	SS	DF	MS	F
Total	8838.87	40		
Between Groups	3892.28	3	1297.12	9.70
Within Groups	4946.59	37	133.69	
Probability < .001				
Significance Level = .05 t = 2.00				
Standard Error = 7.51				
Critical Difference Between Means = 15.04				

Table 5

Analysis of Variance for Effects of Diagnostic Grouping
on FSIQ

Source	SS	DF	MS	F
Total	8131.21	40		
Between Groups	3631.53	3	1210.51	9.95
Within Groups	4499.68	37	121.61	

Probability < .001

Significance Level = .05 $t = 2.00$

Standard Error = 7.16

Critical Difference Between Means = 14.34

Table 6

Analysis of Variance for Effects of Age Grouping on VIQ
for Schizophrenic Patients

Source	SS	DF	MS	F
Total	1440.79	19		
Between Groups	365.21	3	121.73	1.81
Within Groups	1075.58	16	67.22	
Probability = .185				

Table 7

Analysis of Variance for Effects of Age Grouping on PIQ
for Schizophrenic Patients

Source	SS	DF	MS	F
Total	2000.79	19		
Between Groups	368.88	3	122.96	1.20
Within Groups	1631.91	16	101.99	
Probability = .340				

Table 8

Analysis of Variance for Effects of Age Grouping on FSIQ
for Schizophrenic Patients

Source	SS	DF	MS	F
Total	1513.75	19		
Between Groups	391.58	3	130.52	1.86
Within Groups	1122.16	16	70.13	
Probability = .176				

APPENDIX

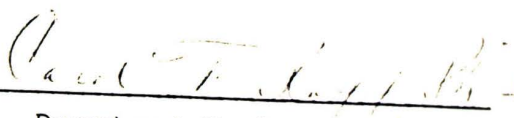


BUREAU FOR HEALTH SERVICES

July 12, 1985

To Whom It May Concern:

Steve Ellis has been given permission to examine the testing files in the Psychology Department of Western State Hospital for the purpose of gathering data for his thesis. It is understood that no name, identification number, or any other method of personal identification will be associated with this data in any way, and that such methods of personal identification will not be used for data storage on electronic or non-electronic media. In this way, the anonymity of the persons involved will be maintained. It is also understood that the data gathered will be used for the purposes of statistical analysis and interpretation, and will not be used for any other purpose not pertaining to the thesis.



Department Head

I understand, and agree to abide by, the provisions stated above.



Graduate Student, A.P.S.U.