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FACTORS UNDERLYING WISC PERFORMANCE
IN JUVENILE PUBLIC OFFENDERS

DISSERTATION
Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By
Nathaniel Cutright Smith, Jr., B.S., M.A.

* * * * * * * *

The Ohio State University
1959

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Renshaw, S., and Smith, N. C., The Tremont project, The Ohio State University Development Fund, Project No. 2-6021-568, 1963


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Smith, N. C., The effect on time estimation of increasing the complexity of a cognitive task, *J. gen. Psychol.* To be published

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Studies in Statistics. Professors Wherry, Toops, Naylor, and Black
# TABLE OF CONTENTS

ACKNOWLEDGMENTS ........................................................................................................... 11

VITA ........................................................................................................................................ iii

LIST OF TABLES .................................................................................................................... vii

Chapter

I. INTRODUCTION .................................................................................................................. 1

Theories of Delinquent Intelligence .................................................................................. 4
Intellectual Functioning in Juvenile Public Offenders .................................................. 6
Sex Differences in Intellectual Functioning .................................................................. 10

II. EVALUATION OF WECHSLER'S THEORY OF DELINQUENT INTELLIGENCE .............. 13

Introduction ..................................................................................................................... 13
Hypotheses ....................................................................................................................... 14
Method .............................................................................................................................. 14

Subjects ............................................................................................................................. 14
Procedure ......................................................................................................................... 15

Results ............................................................................................................................... 16
Discussion .......................................................................................................................... 19

III. FACTORIAL STRUCTURE OF WISC IN MALE AND FEMALE JUVENILE PUBLIC OFFENDERS .................................................................................................................. 24

Introduction ..................................................................................................................... 24
Questions .......................................................................................................................... 24
Method .............................................................................................................................. 25

Subjects ............................................................................................................................. 25
Procedure .......................................................................................................................... 25

Results ............................................................................................................................... 25
Discussion .......................................................................................................................... 30
### TABLE OF CONTENTS (Contd.)

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV. SUMMARY AND CONCLUSIONS</td>
<td>35</td>
</tr>
<tr>
<td>Evaluation of Wechsler's Theory of Delinquent Intelligence</td>
<td>35</td>
</tr>
<tr>
<td>Factorial Structure of the WISC in Male and Female Juvenile Public Offenders</td>
<td>37</td>
</tr>
<tr>
<td>Suggestions for Future Research</td>
<td>38</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>40</td>
</tr>
</tbody>
</table>
LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Description of Sample</td>
<td>15</td>
</tr>
<tr>
<td>2. Means and Standard Deviations of WISC in Male and Female Juvenile Public Offenders</td>
<td>16</td>
</tr>
<tr>
<td>3. Means and Standard Deviations of Deviation Scores for WISC Subtests in Male and Female Juvenile Public Offenders</td>
<td>18</td>
</tr>
<tr>
<td>4. A Comparison of Subtest Rank Orders on WISC in Male and Female Juvenile Public Offenders</td>
<td>19</td>
</tr>
<tr>
<td>5. Intercorrelations between WISC Scores in Male Juvenile Public Offenders</td>
<td>26</td>
</tr>
<tr>
<td>6. Intercorrelations between WISC Scores in Female Juvenile Public Offenders</td>
<td>27</td>
</tr>
<tr>
<td>7. Hierarchical Solution Factor Loadings for the WISC Subtests in Male and Female Juvenile Public Offenders</td>
<td>29</td>
</tr>
<tr>
<td>8. Hierarchical Solution Factor Loadings for the WISC Subtests in Split-half Groups for Male and Female Juvenile Public Offenders</td>
<td>31</td>
</tr>
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</table>
CHAPTER I

INTRODUCTION

Factorial studies of the Wechsler intelligence scales (63,64, 65) have suggested that the test variance can be accounted for on the basis of three or four factors—general, verbal, performance, and memory—from seven years of age to 60 years of age (4,5,22,23,24,26,35, 36,41,52,56). While there are some discrepancies, these can partly be accounted for on the basis of the different types of factor analysis employed. Baumeister and Bartlett (5) have summarized the major conclusions which might be drawn from these studies.

Although the studies of the intellectual functioning of juvenile public offenders employing the Wechsler scales is voluminous (18,53), to date no study has factor analyzed the test performance of this population on the WISC. Further, no study has compared the factorial structure of male and female juvenile public offenders on the WISC. In light of the revealed verbal-performance I.Q. discrepancy found in this population there is a need to identify, describe, and compare the dimensions of ability in male and female juvenile public offenders. The present investigation was aimed at filling this void in our knowledge.

A review of the factor analytic studies of the Wechsler tests reveals that all have employed R factor analytic methods (correlating
tests) while ignoring Q factor analysis techniques (correlating people). Controversy (16,19,20,28,56,57,58) over the relation of R and Q factor analysis has existed since Stephenson (56) introduced the Q technique. Burt (16), Eysenck (28) and Cattell (19,20) have argued that the two techniques are essential transpositions of each other while Stephenson (56,57,58) maintained that Q technique gave different results. Broverman (15), writing about a decade after the height of the controversy (14,15), concluded that Cattell had won "... since over 95 per cent of the factor analyses reported in the past seven years have employed R technique" (15, p. 68).

Broverman (14,15), after a reappraisal of the controversy, has presented new arguments and empirical evidence in support of Stephenson's position; that standardizing the data before factor analysis produces significant differences in results. He concludes that psychologists must recognize the fact that every behavioral act is the expression of genotypic and phenotypic sources of variation. Failure to represent these sources of variation in statistical treatment must lead to the confounding of these sources of variation. "If one accepts the proposition that the laws or regularities which characterize variations in behavior between individuals are not the same as those which characterize variations in behavior within individuals, then such confounding is to be studiously avoided" (14, p. 304). Consequently it was decided to perform both R and Q factor techniques on the data.

Armstrong and Soslberg (3) in their review of the literature on factor analysis have highlighted the fact that the majority of studies
have failed to provide any evidence of the reliability and validity of the emerging factor structures. They proposed three methods for measuring factor reliability and suggested that the investigator specify at least one dependent variable the factor analysis was designed to predict.

With the development of the Wechsler-Bellevue (63), psychologists had a test instrument for assessing qualitative aspects of intellectual functioning in children. Here the component mental abilities and their interrelationships could be examined as well as the general level of intellectual functioning. On the basis of his findings in a study of juvenile sociopaths, Wechsler (62) proposed a theory of their intellectual functioning. The majority of the research on the intellectual functioning of juvenile public offenders since that time has been concerned with testing Wechsler's contentions. The present study provides another opportunity to test Wechsler's (62) theory of delinquent intelligence using the WISC (16).

Diller (27) has pointed out that only a few studies of the intellectual functioning of juvenile public offenders have compared males and females. She also notes that few studies have employed the Wechsler scales for examining sex differences; however, Seashore, et. al., highlights these differences in his standardization sample for the WISC. Gainer (36) studied the differential performance of males and females of average intelligence on the WISC and found the Coding (.01 level) and Comprehension (.05 level) subtests to discriminate the two groups. Miele did not find significant differences between the sexes on overall intelligence on the WISC in normals. However, he did find significant
differences in Coding in favor of the females. The males were higher
on Information, Comprehension, Arithmetic, Vocabulary, Picture Complet-
ion, Block Design and Object Assembly but not significantly so.
Whether these differences hold in the juvenile public offender remains
to be tested.

Theories of Delinquent Intelligence

The role attributed to intellectual functioning in the causation
of crime had been the focus of study of criminologists prior to the
advent of tests designed to measure intellectual functioning. The
classical school of criminology, during the eighteenth century, viewed
man as a free moral agent capable of behaving rationally. Failure to
behave within the dictates of society was viewed as a defect in man's
rational (intellect) abilities. On the other hand, the neoclassical
school viewed the criminal offender as an atavistic moral idiot with
unalterable criminal traits (personality). In this view intellectual
functioning was divorced from the criminal personality in opposition to
the classical view of their interaction as causing criminality. Later,
Goddard (33) investigated the intellectual functioning of delinquents
with his translation of Binet's (12) test and found 50 per cent of them
to be feeble minded. He concluded that mental deficiency was the chief
cause of antisocial behavior.

After the development of the intelligence test the early
research on the intelligence of delinquents tended to be facto-
descriptive studies of quantitative functioning. With the development
of the Wechsler-Bellevue Intelligence Scale (62) psychologists had a
test instrument for assessing the qualitative aspects of intellectual functioning. Wechsler (62) proposed a theory of delinquent intelligence based upon the patterning of the mental components. The first and most important diagnostic sign was that in almost every case the Performance I.Q. was higher than the Verbal I.Q. The second diagnostic sign was that in nearly all cases the sum of the Object Assembly plus the Picture Arrangement subtests were higher than the sum of the Block Design plus the Picture Completion subtests. The third sign was that psychopathic adolescent males obtained a pattern of relative strengths and weaknesses among the subtest scores which revealed an intellectual organization that differed from that of normal adolescents.

The majority of the research on the intellectual functioning of juvenile public offenders since that time has been concerned with testing Wechsler's (63) contentions. In general, the first sign has been found to hold while the evidence for the second sign is ambiguous. The third sign has received relatively little investigation. In 1955 Wechsler (64) expressed some reservation regarding the applicability of his theory to female delinquents.

More recent views of delinquent intelligence have been summarized by Blank (13).

Lower scores on intelligence tests of delinquents have been explained in various ways. According to Williams (1919), the lower scores of delinquents are due to their inability to profit from experience, that is, to learn intelligently. Possibly, their short attention span is related to impulsiveness and restless activity both of which serve to reduce intelligent behavior (Diller). Difficulty in planning ability could make careful, considered behavior difficult for the delinquent child (Lowery). (13, p. 9)
Nevertheless, despite the large quantity of research that has been conducted on the intellectual functioning of juvenile public offenders there is currently no adequate theory of their intellectual functioning. However, there are a number of theoretical accounts of intellectual functioning which could be brought to bear upon the problem (39, 60). However, a detailed appraisal of these theories is beyond the scope of this paper.

**Intellectual Functioning in Juvenile Public Offenders**

The question of the relationship between juvenile delinquency and intellectual characteristics of the offender has a long history, antedating the development of instruments designed to assess their intellectual status. The role attributed to various intellectual functions in the causation of criminal activities has been the focus of hundreds of studies. Early research in the area revealed a relationship of intelligence to crime. Burt (17) found a coefficient of association of .41 for intelligence as a contributing factor within the personality of the offender. Cattell (21) points out that there is a relationship between intellectual status and type of antisocial behavior engaged in. Fraud was found to be associated with the highest levels of intellectual functioning with robbery, larceny, burglary, murder and sex crimes following in that order. Pape was associated with the less intelligent. Howard, Hendrickson, and Cartwright (40) found a lower level of intellectual functioning in gang than non-gang members with social class and race producing differential influences also. Reiss and Rhoades (51) had also found that delinquents were less intelligent than
non-delinquents when social class was held constant. Although measured intelligence has been shown to be associated with types of anti-social behavior, it can not explain all the variation in behavior among juvenile public offenders, but it appears to be an important component of the social maladjustment of these individuals.

Early research on the intelligence of delinquents generally revealed (1) a mean I.Q. score 15-20 points lower than the general population and (2) the incidence of delinquents classified as mentally deficient was 5 to 10 times greater than for the general population (18). More recent studies tend to refute the earlier findings and have revealed a higher mean I.Q. score for the delinquent samples. For example, Merrill (47) reported a mean I.Q. of 92.5 in a sample of 500 court cases employing the 1937 Revised Binet, while the Gluecks (32), using the Wechsler-Bellevue Intelligence Scale, found a mean I.Q. of 92.4 for 500 institutionalized males. Thus, individual tests of intellectual functioning reveal a consistent difference of about 8 I.Q. points between delinquents and the normal population. However, this 8-point difference does not mean that all delinquents are significantly inferior in intelligence to non-delinquents as Glueck's (32) ranges were similar to normals. Further, there was no significant difference in mean I.Q. on the performance section of the Wechsler-Bellevue for delinquents and non-delinquents. These findings are generally supported by Prentice and Kelly (49).

With regard to the evidence on quantitative differences in the intellectual functioning of delinquents it must be remembered that socio-economic and cultural factors influence intelligence test
performance. In light of the fact that most delinquent samples studied are derived from lower socio-economic groups, then one must heed the warnings of Lichtenstein and Brown (42) about drawing conclusions that delinquents are excessively low in intellectual functioning unless the data are based upon comparative studies in children matched for socio-economic status.

Most of the early studies designed to assess the general level of intellectual functioning in delinquents have employed measures which use a single index of rank on the basis of a composite of test items. With the development of the Wechsler-Bellevue Intelligence Scale in 1939 psychologists had an instrument which permitted not only the assessment of global intellectual functioning but also an instrument which permitted them to evaluate the relative strengths and weaknesses of the various intellectual abilities and to provide diagnostic signs of particular clinical patterns. Subsequently, psychologists have attempted to determine, utilizing various techniques, a uniquely identifiable combination or patterning of subtest scores diagnostic of juvenile delinquency. Wechsler (62) has identified one combination of characteristics which he has labeled Adolescent Sociopaths (Delinquents).

There have been numerous studies reported testing the contents of Wechsler in this regard with some supporting and others rejecting the position. Prentice and Kelly (49) have summarized various studies in this area concluding that despite the heterogeneity of the samples there is substantial agreement with Wechsler's position on the Verbal-Performance discrepancy. Fernald and Wisser (29) have pointed out that while the pattern appears to hold for groups it has not been
demonstrated to predict delinquent behavior in the individual case. Further, Graham and Kamano (34) noted the similarity between the pattern of scores on unsuccessful students and the pattern of Wechsler scores attributed to delinquents. A study by Henning and Levy (37) supports the position of Graham and Kamano. In addition, when non-delinquents are matched on the basis of age, education and socio-economic status some studies reveal no significant differences (18,42).

A second approach to analyzing the pattern of organization of intellectual functions has been to rank order the Wechsler subtests. Frost and Frost (30) studied 42 boys diagnosed sociopathic. They found the three highest subtests to be Block Design, Picture Completion and Picture Arrangement while the three lowest were Information, Comprehension and Coding. Diller (27) investigating delinquent girls found the three highest subtests to be Coding, Object Assembly, and Block Design while the three lowest were Arithmetic, Picture Completion, and Information. If one ranks the data provided by the Gluecks (32) the three highest subtests are Picture Arrangement, Object Assembly and Block Design while the three lowest are Arithmetic, Information and Similarities.

A third approach to the investigation of the organization of intellectual functions is that of factor analysis. However, to date this technique has not been employed in the study of the intellectual functioning of juvenile public offenders. A comparative study dealing with the similarities and differences between the structure of mental abilities in male and female juvenile public offenders may be of value in several ways: (1) Testing the stability of invariance of a
factorial solution for groups of dissimilar character, (2) Determining the nature, development and organization of psychological traits, (3) The study of the patterning and interrelationships among significant variables in group differences, and (4) Providing the requisite knowledge and understanding by which early diagnosis and proper training may make it possible to restore many behavioral functions that are currently inaccessible to treatment.

Nevertheless, both intelligence and juvenile public offenders are multidimensional variables which require close methodological consideration if verifiable and repeatable results are to be obtained. Horrocks (38) and Thompson (59) have discussed at some length the difficulty of defining intelligence; while Horrocks (38) and Caplan (18) have reviewed the problems attendant in defining juvenile delinquency. The investigation of the intellectual functioning in individuals defined as delinquent poses an even more complex problem. Even if one does not assume a causative relationship, a carefully planned research design is needed to permit a description that is free of bias.

Sex Differences in Intellectual Functioning

The literature on psychological differences between the sexes is voluminous and has long interested scholars. Although the data yield significant differences in numerous characteristics one must not lose sight of the fact that individual differences within each sex are extremely wide and result in a considerable amount of overlapping of the distributions. Thus, although psychologists have described the
ways in which men and women differ in their behavior, we still know very little about the origins and development of such differences.

Research up to the mid 1930's was motivated primarily by the desire to demonstrate that women were not inherently inferior to males. Here the findings seemed to suggest that the differences in mental abilities were small and that the differences might be accounted for by sociological rather than biological differences. During the 1930's the research shifted to the study of personality and motivational variables rather than intellectual. During the 1950's research emphasis shifted to the study of the developmental processes through which the characteristic male and female response patterns originated. The central concern in the 1960's seems to be directed at determining not how much each sex differs on a given mental trait but rather to examine the different ways the traits are organized or structured within the two sexes.

As psychologists improved their understanding of what intelligence tests were measuring, they came to realize that the complex interaction between genetic possibilities and experience would tend to make boys superior in some kinds of tests and girls superior in others. Since there seemed to be no way of determining which items or subtests were inherently more valuable as intellectual predictors, the policy became that of balancing the two types of tests against each other so that the total score would not give an advantage to either sex. However, with the rebirth of interest in the variety of dimensions of cognitive skills, the possibilities of differences between the sexes has again become an issue.
Certain sex differences in aptitudes have consistently been found to be of statistical and practical significance (2,61). Several of these differences have a bearing upon an individual's performance on the WISC. In terms of motor skills males surpass females in the performance of gross motor movements while females surpass the males on tasks requiring speed and control of fine motor movements. Perceptually, females excel in those tasks which require the rapid perception of details and frequent shifts of attention. On the other hand, tasks concerned with spatial relations favor the males. Linguistically, females tend to be superior in terms of almost all language development from infancy to adulthood. However, sex differences are negligible in terms of verbal comprehension, verbal reasoning, and vocabulary (2). Sex differences also tend to be negligible in terms of the memory processes involved in digit span. In terms of numerical tasks, males are superior to females. Further, males tend to be superior in tasks requiring reorganization or restructuring of the situation. Thus, in general, females tend to be superior in tasks requiring verbal ability, memory, and perceptual speed; while males tend to be superior in tasks requiring numerical reasoning, spatial aptitudes and information.
CHAPTER II

EVALUATION OF WECHSLER'S THEORY OF
DELINQUENT INTELLIGENCE

Introduction

Wechsler (62) has proposed that the intellectual functioning of adolescent sociopaths (juvenile delinquents) can be characterized by three diagnostic signs obtained from their performance on the Wechsler Intelligence Scales. The first and most important diagnostic sign is that in almost every case the Performance I.Q. is greater than the Verbal I.Q. Secondly, in almost every case the sum of Object Assembly and Picture Arrangement subtests are larger than the sum of the Picture Completion and Block Design subtests. Thirdly, the delinquent obtains a clinically diagnostic pattern among the subtest scores.

In general, the research on the intellectual functioning of juvenile public offenders has supported the first diagnostic sign, while the evidence for the second sign is ambiguous. Experimental testing of the third sign has been meagre. However, although the first sign has been shown to hold for groups, there are indications in the literature that the pattern does not identify a high proportion of the individual cases. The same question might be raised about the second diagnostic sign proposed by Wechsler.
Hypotheses

The objectives of this part of the study will be to test validity of Wechsler's (62) contentions regarding the intellectual functioning of male and female juvenile public offenders. The hypotheses to be tested are the following: (1) There will be no significant differences in the verbal, performance and full scale I.Q.'s of male and female juvenile public offenders. (2) There will be no significant differences in the subtest scores between male and female juvenile public offenders. (3) There will be no significant differences in the diagnostic signs of Wechsler (62) between male and female juvenile public offenders.

Method

Subjects

Data on the WISC was obtained on 250 males and 100 females from the files of the Ohio Youth Commission's Juvenile Diagnostic Center. All children who are sent to the center are Ohio court referrals and are accepted on an in-patient basis. Cases recorded from January 1966 to January 1968 were reviewed and subjects ranging in age from 12 to 15 years of age were selected for study. Further, the cases were selected on the basis of (1) negative indications in the neurological and clinical records as to central nervous system lesions and (2) parents' occupation falling within Werner's lower socio-economic status category. Table 1 summarizes the pertinent data on the sample selected for study.
TABLE 1

DESCRIPTION OF SAMPLE

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>S.D.(^a)</th>
<th>Range</th>
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<tr>
<td>WISC V (Total)</td>
<td>90.06</td>
<td>13.12</td>
<td>57-142</td>
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<td>WISC P (Total)</td>
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<td>15.43</td>
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<td>350</td>
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<td>WISC FS (Total)</td>
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<td>AGE</td>
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<td></td>
<td>12-15</td>
<td>350</td>
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<td>57-121</td>
<td>250</td>
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<tr>
<td>WISC P (Males)</td>
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<td>15.49</td>
<td>55-145</td>
<td>250</td>
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<tr>
<td>WISC FS (Males)</td>
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<td>13.41</td>
<td>57-132</td>
<td>250</td>
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<tr>
<td>AGE</td>
<td>14.46</td>
<td></td>
<td>12-15</td>
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<td>WISC V (Females)</td>
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<td>AGE</td>
<td>14.63</td>
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<td>12-15</td>
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</table>

\(^a\) Standard deviation.

Procedure

The data on the 250 males and 100 females were analyzed for significant differences in terms of their verbal, performance, and full scale I.Q.'s. The ten standard subtests were submitted to a similar analysis. The data were also analyzed with regard to the validity of Wechsler's (62) three diagnostic signs.
Results

Table 2 presents the means and standard deviations for the WISC subtests and the verbal, performance, and full scale I.Q.'s for the male and female juvenile public offenders. The first hypothesis was

<table>
<thead>
<tr>
<th>Test</th>
<th>Males Mean</th>
<th>S.D.</th>
<th>Females Mean</th>
<th>S.D.</th>
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<tr>
<td>I</td>
<td>7.9</td>
<td>2.9</td>
<td>7.4</td>
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<tr>
<td>C</td>
<td>8.1</td>
<td>2.2</td>
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<td>A</td>
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<td>S</td>
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<td>V</td>
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<tr>
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<td>3.2</td>
<td>8.1</td>
<td>2.9</td>
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<tr>
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<td>15.4</td>
<td>94.2b</td>
<td>15.3</td>
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<tr>
<td>Full Scale</td>
<td>90.9</td>
<td>13.4</td>
<td>91.1</td>
<td>15.3</td>
</tr>
</tbody>
</table>

*aMale-Female significant at .01 level.

*bVerbal-Performance significant at .01 level.
tested using McNemar's (46) t-test for the significance of difference between unmatched groups and revealed no significant differences in the verbal, performance, or full scale I.Q.'s at the .01 level. The second hypothesis was tested similarly and revealed differences significant at the .01 level on the similarities and coding subtests.

Examination of Table 2 revealed that in both groups the Performance I.Q. was greater than the Verbal I.Q. This discrepancy was tested using McNemar's (46) t-test for significant differences in matched groups and revealed that the differences were significant at the .01 level for both groups. Individual analysis revealed that the performance greater than verbal I.Q. was found to be true for 60 percent of the males and 64 percent of the females.

Testing Wechsler's (62) second diagnostic sign revealed that the sum of the means for the Object Assembly plus Picture Arrangement subtests was larger than the sum of the means for the Block Design plus Picture Completion subtests for the males but not for the females. Individual analysis revealed that 50 percent of the males and 46 percent of the females revealed the pattern predicted by Wechsler.

Table 3 presents the means and standard deviations of the deviation scores on the WISC subtests in the male and female juvenile public offenders. Inspection of the table reveals that the deviations of the subtest means from the mean across subtests fail to reach the extremes of deviation promulgated by Wechsler (62). The data do reveal that the patterning among the subtests differs between males and females. The Comprehension and Coding subtests are below the mean for the males but above the mean for females; the Similarities and Block
### TABLE 3
MEANS AND STANDARD DEVIATIONS OF DEVIATION SCORES FOR WISC SUBTESTS IN MALE AND FEMALE JUVENILE PUBLIC OFFENDERS

<table>
<thead>
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<td>2.2</td>
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<tr>
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<td>-1.59</td>
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<td>- .70</td>
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<td>+ .10</td>
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<td>+1.83</td>
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</table>

Design subtests are above the mean for males but below the mean for females. The remainder of the subtests revealed similar directions of deviation from the mean in males and females. The Spearman Rank Correlation Coefficient (\(r^6\)) between the rank order of the deviation scores was .45 and not significant at the .01 level.

Table 4 presents a comparison of the rank order of the subtests using the scaled scores provided by Wechsler (65). Spearman's (55) Rank Correlation coefficient revealed a rho of .46 and was not significant at the .01 level. Analysis of the rank order of subtests in terms of the three highest and three lowest revealed a high degree of consistency in terms of the three low subtests while there was a divergence in terms of the three highest subtests.
TABLE 4

A COMPARISON OF SUBTEST RANK ORDERS ON WISC IN MALE AND FEMALE JUVENILE PUBLIC OFFENDERS

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Discussion

In general, the results of this investigation are in agreement with previous studies of the WISC in juvenile public offenders. First of all, in terms of general level of intellectual functioning the present study found that juvenile public offenders are operating approximately 10 I.Q. points below the standardization population of Wechsler (65) in terms of their Full Scale I.Q. on the WISC. The study also found the Performance I.Q. to be significantly greater than the Verbal I.Q. These findings are in agreement with the findings reported in Caplan (18) and Prentice and Kelly (49). However, the performance I.Q. was significantly lower than the standardization group and tends
to disagree with the results reported in Prentice and Kelly (49) where performance I.Q. tended to be approximately 100 I.Q. points.

The 10 point Full Scale intelligence quotient difference does not mean that all juvenile public offenders are significantly inferior to nondelinquents as the range of scores included those classified on the Wechsler (65) scale as superior. The finding tends to suggest that the population of juvenile public offenders under investigation tested lower than Wechsler's (65) standardization population. Further, since cultural factors are known to play a role in determining performance on tests of intelligence and in light of the fact that this sample was drawn from the lower socio-economic strata, the findings must be viewed accordingly.

The comparison of the intellectual functioning of male and female juvenile public offenders revealed no significant differences in terms of their verbal, performance and full scale I.Q.'s. This finding is consistent with the results of Gainer (31) in normals. The comparison of the individual subtests of male and female juvenile public offenders revealed that the females scored significantly higher upon the Similarities and Coding subtests. This finding was consistent with prior findings of sex differences on the WISC in normative populations (31).

The data in this study provide an opportunity to test Wechsler's (62) theory of the intellectual functioning of juvenile public offenders. The finding of a significant performance greater than verbal I.Q. in both males and females is consistent with Wechsler's first diagnostic sign. The finding of a performance-verbal discrepancy in
females supports the findings of Diller (27) and stands in contrast with the results of Vane and Eiser (67). Diller also found support for the second diagnostic sign; however, this study failed to confirm that finding for female juvenile public offenders but did support the sign in males. Analysis of the deviation pattern profile failed to support Wechsler in both male and female juvenile public offenders.

Although the findings for the group data support Wechsler's first two signs in males and the first sign in females, the results of the individual analysis fail to confirm that almost all the juvenile public offenders will reveal the signs. This result supports Ferrend and Wiser (29) who pointed out that the verbal-performance appeared to hold for groups but it could not be demonstrated to predict delinquent behavior in the individual case. The present findings extend this conclusion to the second and third diagnostic signs.

Analysis of the deviation pattern profile suggests that men and women juvenile public offenders utilize different abilities or different degrees of like abilities in performing upon the tasks presented by the WISC. This finding is consistent with Wechsler's (65) findings on the WAIS in normals. In this population the women scored significantly higher on the Similarities and Coding subtests. However, in males and females the Similarities score was above the mean across all subtests, but in Coding the females were above the mean across subtests while the males were below the mean. Although there was no significant difference in the Comprehension subtest between male and female juvenile public offenders, the women scored above the mean across all subtests and the men scored below it. This finding suggests that the cognitive
structure underlying WISC performance in male and female juvenile public offenders is different.

The results of this investigation tend to provide experimental support for certain theories of the intellectual functioning of juvenile public offenders. Thurstone's (60) dynamic theory viewed intelligence as the ability to make impulses focal in their early stages and this ability was dependent upon abstraction skills. In view of juvenile public offenders' poor performance upon the Vocabulary and Similarities subtests, one might well conclude that abstraction skills are deficient, consequently tending to support the suggestion that the juvenile public offender is unable to inhibit immediate impulse gratification.

Under the neurological approach Luria's (43) verbal mediation deficiency hypothesis receives indirect support due to the limited development of the verbal system. Here one might infer that a potential defect in the intellectual functioning of juvenile public offenders is that the underdevelopment of language has led to limited verbal planning, i.e., self-regulated behavior and a subsequent dissociation of the verbal and motor systems.

Cattell (21) has proposed a distinction between "Crystalized" and "Fluid" intelligence and his theory would predict that juvenile public offenders would do less well on the verbal section of the WISC. The findings of significant verbal-performance discrepancy in both males and females supports Cattell's predictions.

In summary it can be concluded that there are no significant differences in the verbal, performance, or full scale I.Q.'s in male and female juvenile public offenders. Secondly, females score
significantly higher on the Similarities and Coding subtests than male juvenile public offenders and this finding is consistent with the results in a normal population. Thirdly, this study failed to confirm Wechsler's (62) contentions regarding the intellectual functioning of male and female juvenile public offenders. Finally, the results suggest that the cognitive structure underlying WISC performance is different in male and female juvenile public offenders.
CHAPTER III

FACTORIAL STRUCTURE OF WISC IN MALE AND FEMALE JUVENILE PUBLIC OFFENDERS

Introduction

The results presented in Chapter II suggested that the cognitive structure underlying WISC performance in male and female juvenile public offenders was different. To date no studies have undertaken the investigation of the factorial structure of the WISC in this population. Further, no factor analytic study of the WISC in any population has employed Q technique. This study was designed to fill that gap in our knowledge.

Questions

This study attempted to provide answers to the following questions:

1. What proportion of the common factor variance for both groups is accounted for by a general first-order factor corresponding to Spearman's "g"?

2. Are essentially the same factors identified in the analysis of the two groups?

3. Is there any difference in the extent to which the various tests load upon the factors in both groups?
4. What comparisons can be made between the organization of mental abilities for each group as determined by the correlations among the separate factors or abilities?

5. Are the factorial compositions of individual tests in the battery approximately the same for the two groups or are there differences that suggest that the same tests represent different functions or organizations of such functions for the two groups?

6. Are there any differences in terms of the first five questions when the data are factor analyzed using Q technique?

Method

Subjects

The same as in Chapter II.

Procedure

Intercorrelations of the scores on ten of the subtests of the WISC (optional subtests Digit Span and Mazes excluded) were computed (Pearsonian r's) for the 250 male and 100 female juvenile public offenders. The intercorrelations were then factor analyzed following the method of Wherry (66) for hierarchical solution. The reliability of the obtained factor structure was tested following the split-half procedure suggested by Armstrong and Soelberg (3). Following the procedures of Broverman (14,15) the data were analyzed employing Q technique.

Results

Tables 5 and 6 present the intercorrelations between the WISC scores for male and female juvenile public offenders respectively. The
### TABLE 5

INTERCORRELATIONS BETWEEN WISC SCORES IN MALE JUVENILE PUBLIC OFFENDERS

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*Lower left portion represents correlations for normative scores; upper right portion, ipsitive scores.*
## TABLE 6

**INTERCORRELATIONS BETWEEN WISC SCORES IN FEMALE JUVENILE PUBLIC OFFENDERS**

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*Lower left portion represents correlations for normative scores; upper right portion, ipsative scores.*
Wherry hierarchical solutions for the males and females are presented in Table 7. Decimal points have been omitted and the loadings over .30 were viewed as significant. It is immediately apparent that the common factors extracted in both populations are highly similar. Thus, despite the findings of some sex differences in the means of the subtests the factor analyses of the scores revealed a general and two sub-general factors.

The loadings of the subtests on the general factor are presented in Table 7. The "g" loadings are moderate (median is .57 in both groups). There are no major differences in the weights of the loadings or their patterning on "g" in the two groups. Further the total amount of variance explained by the factor is almost identical for both groups.

Table 7 presents the loadings of the subtests on Sub-general Factor 1 in male and female juvenile public offenders. The subtests which load this factor in male juvenile public offenders are Information, Arithmetic, Similarities, and Vocabulary while the female juvenile public offenders load these four plus Comprehension. The loadings of the subtests upon Factor 1 reveal differences in terms of their weights and patterning with males obtaining higher weights on Information and Arithmetic while females were higher on Similarities and Comprehension. With the exception of the Comprehension and Similarities the differences are slight and there is little difference in the total amount of variance this factor explains for both groups.

The loadings on Sub-general Factor 2 for the groups are presented in Table 7. Here both the male and female juvenile public offenders load the Block Design and Object Assembly subtests with the
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males loading Picture Completion and the Females loading Picture Arrangement. Again one finds differences in the weights and patterning of the loadings upon Factor 2. It is indicated that Object Assembly is a stronger measure of this factor in males than females while Picture Arrangement is a stronger measure of the factor in females than males. Again the total amount of variance explained by this factor is similar for both groups.

Table 8 presents the results of the split-half reliability investigation of the obtained factorial structures. Observation of the table reveals that the factorial structure for the males in split-half groups was almost identical in terms of the factors extracted and the pattern of loadings upon the factors and the test variance accounted for. For the females one finds that the split-half groups resulted in identical factors extracted but that the pattern of loadings on the factors was not consistent. This result might be due to the limited sample size when the females split. On the basis of the above data there is reason to believe that the results obtained in the males is reliable; while that on the females, though consistent with similar results, is still open to question. A similar analysis with the factorial structure obtained using the Q technique revealed the obtained results to be unreliable so they were not presented here.

Discussion

Despite major differences in the populations the results of this study are similar to the findings of Baumeister and Bartlett's (27) hierarchical solution for Wechsler's (65) standardization population.
### TABLE 8

HIERARCHICAL SOLUTION FACTOR LOADINGS FOR THE WISC SUBTESTS IN SPLIT-HALF GROUPS
FOR MALE AND FEMALE JUVENILE PUBLIC OFFENDERS

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</table>

^a Males.
^b Females.
Both obtained general, verbal and performance factors. Further, the subtests tend to follow the same pattern of loadings on the "g" factor. However, the verbal and performance factors loaded different tests and similar tests had differential loadings than in the normative population of Wechsler (5). Even though the reference abilities discovered by factor analysis in both groups are similar, this finding is ameliorated by the lack of matching controls so that one might make a definitive statement.

It is interesting to note that an anticipated fourth factor, viz. memory or stimulus trace or freedom from distractability, was not found despite the clinical descriptions of this population as being impulsive (50). However, when the Digit Span subtest was added to the intercorrelation matrix for the males, the fourth factor was extracted, but none of the loadings attained a significant weighting.

The availability of complete factor analyses of the same intelligence tests for representative subjects in both males and females makes possible for the first time a direct evaluation of the differences in intellectual organization in this population. However, this comparison must be tempered by the failure to replicate the female factorial structure. Further, one must keep in mind that any statements about the intellectual organization must be qualified by the statement as assessed by the Wechsler subtests.

As has been found in prior work concerning the WISC the essentially verbal tests, particularly Information and Vocabulary, are the best measures of "g" in both the male and female juvenile public offenders, despite the verbal-performance discrepancy in I.Q. The
poorest measures of "g" are Comprehension and Coding in males and Picture Arrangement and Coding in females.

In this study noteworthy shifts in the patterns of loadings between males and females on the two sub-general factors prevail. This finding suggests that the nature of the tasks posed by these subtests differ from each other in the two groups as a function of the cognitive organization in males and females.

Sub-general Factor 1 in both groups are interpreted as verbal factors. This factor appears to reflect that aspect of verbally retained knowledge imposed by formal education. The major difference between the two groups on this factor relates to the low loading of the Comprehension subtest in males. This finding leads to the tentative hypothesis that male juvenile public offenders are significantly poorer than females in the application of judgment to situations following some implicit verbal manipulation. This hypothesis is strengthened by the high loading on the Similarities subtest (verbal categorizing) in women.

Both groups are characterized by Sub-general Factor 2 named Performance. This factor appears to reflect the ability to organize nonverbal material, visually perceived, into meaningful wholes against a time factor. Although the nature of the tasks differ from test to test all involve the formation of some kind of Gestalt. Here one finds a differential loading with both males and females loading Block Design and Object Assembly and males loading Picture Completion while the females load Picture Arrangement. The low loading on Picture Arrangement (social judgment) in males leads to the tentative hypothesis that male juvenile public offenders are limited in their ability to size up
a total situation, especially one involving social awareness and judgment. This hypothesis finds support in the works of Merrill (47) and Abel and Kinder (1) who noted delinquents' lack of discrimination in social judgments.

In summary this study found that WISC performance in both male and female juvenile public offenders can be accounted for by reference to three factors--general, verbal and performance--and that these common factors are similar to those found in other populations. Secondly, factorial solutions obtained indicated that the same tests did not load on the same factors in male and female juvenile public offenders. Further, the degree of loading among the loadings common to each group revealed differential weightings.
CHAPTER IV

SUMMARY AND CONCLUSIONS

The WISC subtest, Verbal, Performance, and Full Scale I.Q. scores were obtained in 250 male and 100 female lower socio-economic juvenile public offenders committed by the courts on a myriad of offenses to the Ohio Youth Commission's Juvenile Diagnostic Center. The subjects ranged in age from 12 to 15 years with a mean age of 14.5 years.

The first part of the study was aimed at testing for differences in intellectual functioning between the male and female juvenile public offenders. Further, the study investigated the validity of Wechsler's (62) contentions regarding the intellectual functioning in juvenile public offenders. The second part of the study investigated the cognitive organization in male and female juvenile public offenders by factor analyzing the WISC data following the method for hierarchical solution proposed by Wherry (66).

The following is a list of the principle conclusions that can be drawn from this investigation:

**Evaluation of Wechsler's Theory of Delinquent Intelligence**

1. The present sample of juvenile public offenders was operating approximately 10 I.Q. points below the
standardization population in terms of their Full Scale I.Q.'s.

2. The range of scores obtained in this population was similar to the standardization population.

3. The present sample was atypical of other studies of juvenile public offenders in view of the fact that their Performance I.Q. was significantly lower than the standardization population which is not generally the case.

4. There were no significant differences in verbal, performance or full scale I.Q.'s.

5. The female juvenile public offenders scored significantly higher on the Similarities and Coding subtests.

6. The Performance I.Q. greater than Verbal I.Q. proposed by Wechsler was supported in the group data for both males and females, but the discrepancy was true for only 60 per cent of the males and 64 per cent of the females.

7. Wechsler's second diagnostic sign that the sum of the Picture Arrangement and Object Assembly subtests would be greater than the sum of the Block Design plus Picture Completion subtests held for the male group data but not the female and only occurred in 50 per cent of the males and 46 per cent of the females.

8. The study failed to find the unique patterning among the subtests proposed by Wechsler for either group.

9. The data reveal that the deviation pattern profile differs for males and females.
Factorial Structure of the WISC in Male and Female Juvenile Public Offenders

1. Factor analysis of the male and female juvenile public offenders extracted three common factors—general, verbal and performance—in both groups.

2. There was no tendency for the general factor to be stronger in either group.

3. The subtests tended to follow the same pattern and weighting of loadings as "g" in both groups.

4. The first sub-general factor was labeled verbal and loaded Information, Arithmetic, Similarities and Vocabulary in both groups and the females also loaded the Comprehension subtest.

5. The second sub-general factor was labeled performance and loaded Block Design and Object Assembly in both groups; while the males loaded Picture Completion and the females loaded Picture Arrangement.

6. The obtained factorial structure was found to be reliable in males but unreliable for females.

7. The factorial structure obtained using Q technique was found to be unreliable.

This study was designed to investigate the intellectual functioning of male and female lower socio-economic juvenile public offenders. The findings of the study must be interpreted within the following considerations. First of all the study involved a relatively limited sample of juvenile public offenders. Second, the sample was somewhat
heterogeneous in terms of age, education and race which are factors known to influence factorial structure. The unreliability of the female factorial structure suggests that limited value be placed upon the data.

Suggestions for Future Research

The findings of this study lead to a number of problems for further investigation. First, there is a need to replicate the study in a sample that more adequately controls for age, education, race and type of offense. Secondly, there is a need to obtain a matched control group of normal subjects for further comparison of the differences in intellectual functioning. Thirdly, there is a need to investigate the intellectual functioning in middle and upper socio-economic juvenile public offenders.

Thurstone (60) proposed a dynamic theory of intellectual functioning which viewed intelligence as the ability to make impulses focal in their early stages and this ability was dependent upon abstraction skills. This sample's general linguistic retardation and the work of Bernstein (6,7,8,9,10,11) on the relation of social class, language and cognitive functioning as well as the work of Luria (44) on the role of language in self regulation suggests that this area might be one worthy of more detailed investigation.

There is a marked need to investigate the intellectual functioning of the juvenile public offender from an organized theoretical point of view. The concentration of research work around the theory of Wechsler has limited the chances for gaining insight into the cognitive
structure of individuals who are willing to accept anti-social or deviant means to reach their goals. It is to be hoped that by the application of these diverse views of intellectual functioning to the juvenile public offender knowledge will be gained that can help rehabilitate these individuals and more hopefully prevent the development of such deviant personalities.
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