Concurrent validity of the narrow-band and broad band intellectual scales of the personality inventory for children within a preschool population.

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LA THÈSE A ÉTÉ MICROFILMÉE TELLE QUE NOUS L'AVONS RÉCU
CONCURRENT VALIDITY OF
THE NARROW-BAND AND BROAD-BAND
INTELLECTUAL SCALES OF
THE PERSONALITY INVENTORY FOR CHILDREN
WITHIN A PRESCHOOL POPULATION

by

© Joan E. Durrant

A Thesis
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ABSTRACT

The present study investigated the clinical utility of the narrow-band and broad-band intellectual scales of the Personality Inventory for Children (PIC) as screening measures for preschool children. Its second major purpose was to provide a comparison of the effectiveness of the narrow- and broad-band intellectual scales as screening measures for these children. Correlational and regression analyses were performed for samples of 20 Normative and 20 Clinical preschoolers, as well as for the group as a whole, employing the following PIC scales: Achievement, Intellectual Screening, and Development of the narrow-band scales, and Scale IV: Cognitive Development of the broad-band scales. The criterion measures utilized were each child's GCI on the McCarthy Scales of Children's Abilities and his or her IQ obtained on the Peabody Picture Vocabulary Test. It was hypothesized that scores on the four PIC scales would correlate negatively and significantly with scores on the criterion measures. It was further predicted that Scale IV would perform in a manner similar to that of the DVL scale. These hypotheses were strongly supported. It was concluded that the narrow- and broad-band intellectual scales of the PIC appear to have considerable concurrent validity for a heterogeneous preschool population. The findings further indicate that the broad-band scale is as effective a screening device as are the narrow-band scales.
To the memory of my Mother, who, even in her darkest moments, always found the strength to encourage me.
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CHAPTER 1

INTRODUCTION

In their investigations of personality structure and its development, researchers seek to identify and classify the differences between individuals as well as to determine the commonalities among them. This knowledge enables clinicians to diagnose disorders of personality functioning and to institute psychotherapeutic measures geared to individual needs.

Until quite recently, however, most of the research aimed toward the classification of personality characteristics has focused on adult functioning. There has been a relative scarcity of research pursuing the development of an empirically-based framework from which to view childhood personality disorders.

The present study is an attempt to answer this need. It is an investigation into a comprehensive objective personality measure which is potentially valuable for researchers in their explorations of children's personality structure and for clinicians attempting to provide individualized treatment for their young clients.

In this chapter, the recent trend toward objective assessment of children's personality functioning will be
described. This will be followed by a discussion of the two general approaches that have been taken in the literature. Finally, a description of the multifactorial measures that have recently been devised will be presented, with a focus on the Personality Inventory for Children and a primary emphasis on its intellectual scales.

The Need for Objective Personality Measures for Children

Over the past two decades there has developed a dramatic increase in efforts aimed at devising objective measures to assess children's personality functioning. This has occurred in an attempt to meet several needs in research into child development and childhood psychopathology.

First, there is no stable framework at present from which to view and classify children's disorders (Achenbach, 1978). In fact, it was not until the 1960's that any extensive efforts were made in this direction. The categories that have been proposed in the most recent Diagnostic and Statistical Manual of Mental Disorders (DSM-III: American Psychiatric Association, 1980) are generally theoretical and descriptive, rather than operationalized and testable (Freeman, 1971). Further, the classification system employed in DSM-III tends to merely extend adult diagnostic categories to children or label groups of symptoms (Wirt & Lachar, in press). Thus, there has been
a need to develop an empirically-based taxonomy founded upon principles of developmental psychology upon which to base treatment and research in this area.

Second, most of the assessment tools for measuring child psychopathology have consisted of projective techniques, behavioural observations, and interviews. There are no norms and there are few reliability or validity data for such measures (DeKrey & Ehly, 1981; Klinedinst, 1975). These techniques tend to become highly personalized and the findings to be subjective and dependent on the examiner's skill. There is no generally accepted method for the assessment of children's personality and behaviour (DeKrey & Ehly, 1981) - a need which researchers have attempted to meet with the development of objective measures.

Third, the screening methods that have been available have not been sufficiently thorough to yield necessary information regarding a particular child. In a study of ten latency aged children, Novick, et al. (1966) found that a typical intake interview with both parents and their child reveals only 17% of those symptoms discovered by means of an objective inventory completed by the child's parents, teacher, and home and school observers. Thus, there has been a need for a comprehensive screening measure that can tap a wide variety of areas of functioning in an efficient manner.
Fourth, the nature of special education settings calls for individualized programming which takes each child's unique personality characteristics into account. This has been difficult to achieve without the availability of structured, objective tests for which norms have been developed. Such tests would make it possible to determine specific areas of strength and weakness in a particular child, which teachers could incorporate into their academic programs.

Finally, empirical research requires the operationalization of variables, standardization, construction of norms, and the use of reliable and valid measures. These can only be provided by structured, objective assessment instruments which can be used to compare groups of children on a variety of dimensions of personality functioning.

Increasing recognition of these areas of need and concentrated efforts toward meeting them has resulted in the development of a great number of standardized objective tests designed to measure a wide variety of children's personality characteristics.

Two general approaches have been taken in the development of these tests and their utilization in the classification of child psychopathology. The first of these searches for narrowly defined areas of disturbance. This "narrow-band" approach generally results in a relatively comprehensive
classification of personality characteristics into specific categories, such as Aggression, Hyperactivity, or Delinquency.

The alternative approach looks for more general, "broad-band" patterns of disturbance. These studies strive for "descriptive efficiency" (Peterson, 1960) and attempt to classify symptoms into two or three broad categories, such as Undercontrolled or Learning Problems.

A number of investigators have utilized one or both of these approaches in attempts to delineate syndromes of child personality disorder empirically and to refine existing assessment instruments. The generality of these studies is striking. Although the procedures and nomenclature employed vary between studies, the factors obtained are remarkably similar.

Broad-Band Approach

Peterson (1960, 1961) has noted that factor analyses of instruments measuring personality functioning have consistently yielded two major broad-band factors: General Adjustment and Introversion-Extroversion. The first of these "is primarily marked by obedience (in children), stability of interests and attitudes, responsibility, conscientiousness, goodnatured, easygoing tendencies, patience, trust, good manners, freedom from jealousy, determination and perseverance, cooperativeness, modesty, and
emotional stability" (Peterson, 1960, p. 469-470).

Factor II "is principally marked by boldness, outgoing social tendencies, open expressiveness, gregariousness, energetic alertness, cheerfulness, attentiveness to others, and assertiveness" (Peterson, 1960, p. 470).

Peterson (1961) further concluded that when problem behaviours or symptoms are assessed, two major factors are generally found – Conduct Problems and Personality Problems. "Both problems are personality expression, and both affect conduct... In one case, impulses are expressed and society suffers; in the other case impulses are evidently inhibited and the child suffers" (Peterson, 1961, p. 206).

These two patterns of deviant personality functioning have been substantiated by a number of investigators (Quay & Quay, 1965; Quay, Morse & Cutler, 1966). The broad-band syndrome labelled Conduct Problems by Peterson has been found under the labels of Immature Conduct Problem (Lessing & Zagorin, 1971), Aggressive (Ross, Lacey & Parton, 1965), Anger-Defiance (Kohn & Rosman, 1972), Hostile-Aggressive (Behar & Stringfield, 1974), Aggression (Miller, 1967), Aggressive-Conduct Disorder (Conners, 1970), Impulsivity (Ferguson, Partyka & Lester, 1974), and Externalizing (Achenbach, 1978).

Support for Peterson's Personality Problems factor has also been provided by a number of investigators. They have
variously named it Withdrawn (Ross, Lacey & Parton, 1965), Apathy-Withdrawal (Kohn & Rosman, 1972), Anxious-Fearful (Behar & Stringfield, 1974), Inhibition (Miller, 1967), Anxious-Immature (Conners, 1970), and Internalizing (Achenbach, 1978).

In addition to these major dimensions, two further broad-band categories of disturbance have found support in the literature. One of these has been called Learning Problems (Achenbach & Edelbrock, 1978; Clarfield, 1974), Learning Disability (Cowen, Dorr, Clarfield, Kreling, McWilliams, Pokracki, Pratt, Terrell & Wilson, 1973), and Learning Difficulty (Borgatta & Fanshel, 1965).

The other broad-band syndrome that reappears in the literature Achenbach and Edelbrock (1978) have labelled Pathological Detachment. It has also been found under the names of Maladaptation (Lorr & Jenkins, 1953), Inadequacy-Immaturity (Quay, Morse & Cutler, 1966), and Severe and Diffuse Psychopathology (Achenbach, 1966). Although there is some lack of uniformity in the findings related to this factor, Achenbach and Edelbrock (1978) conclude that it seems to reflect general abnormality.

In summary, four major broad-band factors have consistently found support in the literature. The first is related to externalization and conduct problems. The second involves internalization and personality problems. The
third factor reflects learning difficulties and the fourth is related to general abnormality.

Narrow-Band Approach

A considerable number of studies have investigated narrow-band personality factors, for example, Miller (1967), Dreger et al. (1964), and Borgatta and Fanshel (1965). Achenbach and Edelbrock (1978) reviewed 27 of these studies and found substantial support for the following fourteen narrow-band factors: Academic Disability, Aggressive, Anxious, Delinquent, Depressed, Hyperactive, Immature, Obsessive-Compulsive, Schizoid, Sexual Problems, Sleep Problems, Social Withdrawal, Somatic Complaints, and Uncommunicative.

Therefore, it appears that there is considerable support in the literature for the notion that children's personality disorders can be classified into distinct patterns or syndromes. Description of these syndromes can be of a general nature, involving broad areas of functioning, or it can be quite specific, narrowly defining areas of disturbance.

Clinical Applications for Preschool Populations

Both broad- and narrow-band approaches have been taken within clinical settings. It would seem that broad-
band instruments are potentially useful as screening measures, while narrow-band scales would provide more information for individualized programming.

A number of measures designed for assessing broad- and narrow-band factors exist for school-age children and adolescents. However, very few are available for use with preschoolers. A number of problems inherent in attempting to assess the personality functioning of young children have contributed to the relative lack of construction of personality measures for this age group. Their expressive and receptive language skills are limited, they generally cannot read or write, have difficulty following instructions, have brief attention spans, frequently exhibit response sets, and tend to respond with what they believe the examiner wants to hear, rather than with what they truly feel.

Nevertheless, a number of nonprojective personality measures have been devised for preschool children. In order to eliminate the difficulties described above, these measures are generally designed to be completed not by the child himself, but by someone who is quite familiar with him. This is usually his preschool teacher, one or both of his parents, a day care worker, or a clinician.

Of these tests, a few are multifactorial. The remainder focus on one aspect of personality functioning, for example, the Stanford Preschool Internal-External Scale (SPIES:
Mischel, Zeiss & Zeiss, 1974); the Pupil Rating Scale (PRS: Mykelbust, 1971), which is a screening test for learning disabilities; the Barber Scales of Self-Regard (Barber, 1975); the Maryland Preschool Self-Concept Scale (Datlow, 1978); and the It Scale for Children (It Scale: Brown, 1956), a measure of sex-role preference.

There are several instruments available that assess general patterns of behaviour in preschool children. One of these is the Preschool Behavior Questionnaire (PBQ: Behar & Stringfield, 1974). However, this inventory consists of only 36 items yielding scores on three scales: Hostile-Aggressive, Anxious-Fearful, and Hyperactive-Distractible. Thus, it does not appear to be a very comprehensive personality measure.

The Vineland Social Maturity Scale (VSMS: Doll, 1953) assesses adequacy in the areas of locomotion, communication, occupation, social relations, self-help, and self-direction. It is comprised of 117 items that yield a social age and a social quotient (SQ). Thus, although several areas of development are tapped, only one score is obtained.

The Child Behavior Rating Scale (CBRS: Cassel, 1962) is comprised of 78 items which are classified into five adjustment areas: Self-Adjustment, School Adjustment, Home Adjustment, Social Adjustment, and Physical Adjustment. Although the author states that the test has been designed "for preschool and primary grade pupils", there are no norms
provided for preschoolers. If test users employ the norms for primary grade pupils in assessing preschoolers, given what is known about the rapid socio-emotional development of children in the early school years, the younger children will likely be inappropriately diagnosed as poorly adjusted.

In an effort to overcome the difficulties and weaknesses of existing instruments, Wirt, Seat, and Broen (1977) developed the Personality Inventory for Children (PIC). The PIC is a comprehensive instrument which yields both broad- and narrow-band measures of personality functioning in children and provides preschool norms. The present study will examine the relative usefulness of the broad- and narrow-band scales of the PIC for preschool children. Thus, a detailed description of the test and its construction will be presented.

The Personality Inventory for Children

The PIC was developed in an attempt to provide a measure to classify children's psychological problems that could be analyzed in the same manner as the MMPI (Hathaway & McKinley, 1951). The PIC is completed by one of the child's parents, usually the mother. The items were constructed so that they can be understood by a person of at least sixth grade reading ability.

Analysis of the parent's responses to the 600 true-
false questions composing the PIC yields a profile of his or her child's psychological functioning. Measures are obtained on the following sixteen profile scales: Lie, F, Defensiveness (the Validity scales), Adjustment (a Screening scale), Achievement, Intellectual Screening, Development, Somatic Concern, Depression, Family Relations, Delinquency, Withdrawal, Anxiety, Psychosis; Hyperactivity, and Social Skills (the Clinical scales).

Construction of the Profile (Narrow-Band) Scales

Eight of the PIC profile scales were constructed using a rational method (Wirt, Lachar, Klinedinst & Seat, 1977). These are: Lie, Development, Somatic Concern, Depression, Family Relations, Withdrawal, Anxiety, and Social Skills. Four or more judges familiar with the content areas for which they were selecting items nominated items from the PIC item pool. Items were required to meet two criteria: 1) at least three-quarters of the judges had to nominate the item as belonging on the scale, and 2) at least two-thirds of the judges had to key the item in the same direction. Further, the point-biserial correlation between item response and total scale score had to be .25 or greater for an item to be retained.

The remaining eight scales were constructed using an empirical strategy. These are: F, Defensiveness, Adjustment,
Achievement, Intellectual Screening, Delinquency, Psychosis, and Hyperactivity. Most of these scales were constructed using the method developed by Darlington (Darlington, 1964; Darlington & Bishop, 1966). Detailed descriptions of these methods of scale construction are provided in the test manual (Wirt, Lachar, Klinedinst & Seat, 1977).

Norms for preschool through adolescent subjects based on a sample of 2582 normal children are also presented in the manual. Four normative samples were employed: 6-16 years: 1187 boys, 1203 girls; preschool: 102 boys, 90 girls.

Three test-retest reliability studies were carried out. The mean product-moment reliability coefficient (r) obtained from a clinic sample of 34 test-retest pairs after an average interval of 15.2 days was .86 (range: .46 to .94) for the sixteen profile scales. On a sample of 46 normative children, the mean test-retest product moment correlation (r), after a mean interval of 50.96 days was .71 with a range of .39 to .89. The third sample consisted of 55 children who were retested after a two-week interval. The retest product moment correlation (r) ranged from .68 to .97 with a mean of .89.

Construction of the PIC Factor (Broad-Band) Scales

A recent study has investigated the factor structure
of the twelve clinical profile scales of the PIC (Lachar, Gdowski & Snyder, in press). The PIC profile scales provide measures of specific, or narrow-band, forms of pathology, such as hyperactivity or withdrawal. The factor analysis was intended to provide measures of more general, or broad-band patterns of disturbance. The investigators felt that such an analysis would allow comparisons to be made of the relative values of broad-band and narrow-band instruments in the assessment of children's personality. They also felt that a broad-band approach would be more efficient in a clinical setting and that the availability of both taxonomic systems would be useful to researchers in the exploration of etiology, treatment, and prognosis related to childhood psychopathology.

The study was based on 1226 protocols from a clinic sample of 816 boys and 410 girls who were referred due to problematic behavioural and emotional adjustment. The normative sample of 2582 protocols was the same as the original standardization sample.

Four factors emerged from the analysis: Factor I - Undisciplined/Poor Self Control (30 Items), Factor II - Social Incompetence (30 items), Factor III - Internalization/Somatic Concern (31 items), and Factor IV - Cognitive Development (25 items). Thus, the final inventory was composed of 116 items, as compared to 500 items on the
original PIC, comprising four broad-band factor scales. Each item appears on only one of the four scales.

Item overlap and correlations between the profile and factor scales were calculated. There was found to be high item overlap and correlations (> .60) between Scale I and the Adjustment, Delinquency, and Hyperactivity scales and moderate correlations (.50's) between Scale I and the Social Skills scale. Scale II obtained high item overlap and correlations (.68 - .82) with the Social Skills and Depression scales. High correlations (.64 - .79) and item overlap were found between Scale III and the Somatic Concern, Depression, and Anxiety scales. High item overlap and correlations (.78 - .87) were found between Scale IV and the Intellectual Screening and Development scales. Moderate item overlap and correlations of .57 - .76 were found between Scale IV and the Achievement and Psychosis scales.

Alpha coefficients of internal consistency for the four factor scales within the clinic sample were found to be: Scale I: .92, Scale II: .89, Scale III: .82, and Scale IV: .81. The following mean test-retest reliability coefficients for one clinical (N=34) and two normal (N=46, N=55) samples were obtained: Scale I: .91 (range: .85 to .97); Scale II: .91 (range: .77 to .96); Scale III: .90 (range: .83 to .95); and Scale IV: .82 (range: .70 to .90).

In ANOVA analyses of scale validity, the factor scales
were found to differentiate groups significantly. The six study samples employed were: hyperactive, somatizing, psychotic, retarded, delinquent, and cerebral dysfunction.

DeKrey & Ehly (1981) found that the factor scales differentiated between regular and special students in a sample of 38 children from elementary and secondary school classes. Snyder (1982) factor analyzed extensive behavioural ratings of 691 children and adolescents obtained from parents, teachers, and psychiatric residents. He correlated the four PIC factor scores with the problem-behaviour factor scores and obtained 50 problem-behaviour correlates of the factor scales. Strong evidence of the convergent and discriminant validity of the four factor scales was found.

Therefore, it appears that the four factor scales of the PIC provide substantially reliable and valid (construct) measures of broad-band dimensions of child psychopathology. This suggests that the shortened form of the PIC is potentially useful in clinical settings as a screening instrument that is more easily administered than the original 600-item inventory. Its brevity would enable the respondent to complete it more quickly and easily and would greatly simplify scoring and interpretation. However, the loss of 484 items from the original inventory raises the question of whether the loss of information involved in using the
shortened form seriously detracts from the usefulness of the test. The present study will take a first step in addressing this issue by examining the broad- and narrow-band measures of intellectual functioning provided by the PIC.

The Intellectual Scales of the PIC

Three of the narrow-band scales of the PIC are primarily related to intellectual functioning: Achievement, Intellectual Screening, and Development. Of the four broad-band scales, Scale IV: Cognitive Development provides a measure of intellectual development and abilities. The information presented here is based on research conducted by Wirt, Lachar, Klinedinst, and Seat (1977) in their construction of these scales.

The Achievement Scale (ACH) contains 31 items. It was designed to identify "children whose academic achievement is significantly below age expectation though they may possess adequate intellectual capacity" (Wirt, Lachar, Klinedinst & Seat, 1977, p. 16). Its construction was based on protocols of 49 learning disabled boys and 50 controls in grades two and three. ACH item factor groupings and correlations with other PIC scales suggest that this scale measures cognitive abilities primarily, and poor psycho-social adjustment secondarily.

In a sample of 72 children between the ages of 5-6
and 13-3 who were being seen for psychiatric evaluations. ACH T scores were found to correlate -.61 with the Reading Comprehension standard score, -.42 with the Mathematics standard score, and -.59 with the Total Achievement standard score of the Peabody Individual Achievement Test (PIAT). (A T score is defined as a standard score with a mean of 50 and a standard deviation of 10). Eighty-eight percent of those children who obtained ACH scores of greater than 69T were classified by the PIAT as poor achievers in reading comprehension. Only 24 percent of the children who obtained ACH scores of less than 69T were so classified. Sixty-four percent of children who obtained ACH scores of greater than 69T were classified as poor achievers in mathematics, while twenty-four percent of those who obtained ACH scores of less than 60T were so classified by the PIAT. Thus, the ACH scale appears to reflect the age-appropriateness of current level of reading comprehension more accurately than it reflects current mathematical ability for school-age children.

The Intellectual Screening Scale (IS) is a 34-item scale which was designed to identify "children whose difficulties may be related to impaired intellectual functioning and for whom an individual assessment would be indicated" (Wirt, Lachar, Klinedinst & Seat, 1977, p.18).

Correlations between IS and other PIC scales and the item
factor groupings suggest that this scale is related to achievement, cognitive deficits, poor coordination, and generally delayed development. Its construction was based on a comparison of protocols of 65 retarded, 100 non-retarded disturbed, 30 psychotic, and 325 normal children. The scale was found to correctly identify 92% of the retarded, 90% of the non-retarded disturbed, 38% of the psychotic, and 99% of the normal children using a classification decision rule of more than 19 (raw score).

In a sample of 75 children between the ages of 5-2 and 13-3, IS T scores correlated -.55 with Full Scale IQ (usually WISC-R, occasionally Stanford-Binet or WPPSI), -.40 with PPVT IQ and -.31 with the Porteus Maze Test Quotient. Eighty-three percent of the children with IS scores of greater than 89T obtained IQ scores of less than 85. Eighty-five percent of those with IS scores of less than 60T obtained Full Scale IQ scores of greater than 84. When these relationships were examined separately for each sex, differences were found. All girls with IS scores of greater than 89T obtained IQ's of less than 85, and all girls with IS scores of less than 60T obtained IQ's of greater than 84. However, only 72% of boys with IS scores of greater than 89T obtained IQ's of less than 85 and 80% with IS scores of less than 60T obtained IQ's of greater than 84. In support of Wirt et al.'s findings, Porter (1980) found that for a
sample of 100 learning disabled children (87 boys and 13 girls) between the ages of 6.5 and 15.3 years, the mean IS score was greater than 70T although all of the subjects had Full Scale IQ's between 85 and 115 on the WISC. Thus, it appears that the IS scale identifies children for whom an extensive intellectual assessment is indicated. These children would not necessarily be found to have intellectual difficulties by Full Scale IQ scores.

The Development Scale (DVL) is composed of 25 items selected to measure poor intellectual and physical development. DVL item factor groupings suggest that this scale "primarily reflects retarded development in motor coordination, poor school performance and lack of any special skills or abilities" (Wirt, Lachar, Klinedinst & Seat, 1977, p. 20). It is also related to limited motivation to achieve in school, clumsiness and weakness, limited reading skills, and deficient pragmatic skills.

Mean scores of 75T for a group of 56 male psychotics, 79T for a group of 85 male retardates, and 64T for a sample of 63 males with minimal cerebral dysfunction reflect considerable construct validity. Lower values were obtained for samples of 200 non-retarded clinic boys (60T), 118 delinquents (57T), 35 somatizers (54T), and 35 diabetics (50T). A group of 75 boys who had serious reading disabilities obtained a mean DVL score of 62T, while a group of boys
reading at grade level and matched on IQ obtained a mean DVL value of 44T.

Scale IV: Cognitive Development, of the broad-band scales, is comprised of 25 items describing developmental milestones and current abilities and talents. All items had to obtain factor loadings of greater than or equal to .29 to be retained. The alpha coefficient of internal consistency was found to be .81 and the test-retest correlation estimating scale stability was .82. Scale IV significantly differentiated among hyperactive, somatizing, psychotic, retarded, delinquent, and cerebral dysfunction samples. The mean scale score of the retardation sample was significantly higher than that obtained by the other five groups. The mean scale score of the psychotic sample was significantly higher than that obtained by the hyperactive, somatizing, delinquent, and cerebral dysfunction groups. The cerebral dysfunction sample obtained a mean scale score that was significantly higher than those of the remaining three groups. The hyperactive group obtained a significantly higher mean scale score than the somatizing sample.

It should be noted that in all studies in which the age range of the subjects was reported, the children were of school age.
The Present Investigation

The purpose of the present study is to provide an initial step in an examination of the comparative utilities of the narrow- and broad-band scales of the PIC for a preschool age population. It will focus on the intellectual scales—Achievement, Intellectual Screening, and Development of the narrow-band scales, and Scale IV: Cognitive Development of the broad-band scales.

Specifically, the purpose of the present study is to provide measures of concurrent validity for the four intellectual scales among normative and clinical preschoolers. If these scales are found to have concurrent validity, then they have potential value as screening measures which could substitute for more time-consuming individual assessment instruments. A second purpose is to provide a comparison of the effectiveness of the narrow- and broad-band intellectual scales as screening measures for preschool age children.

Expectations

The hypotheses presented here are based on findings of Wirt et al.'s (1977) investigations of the intellectual scales.

Primary hypotheses. 1. On the basis of measures of construct validity provided in the literature, it ispredicted that scores on the four PIC scales (ACH, IS, DVL, Scale
IV) will correlate negatively and significantly with scores on individual intellectual assessment instruments.

2. Since Scale IV was derived from the narrow-band scales and since it correlates most highly with the DVL scale, it is predicted that it will perform in a manner similar to that of the DVL scale.

Secondary hypotheses.

1. It is expected that a stronger negative correlation will be found between ACH T scores and scores on a test measuring verbal comprehension than between ACH T scores and overall ability. This prediction is based on the observation that ACH appears to reflect ability in reading comprehension.

2. A stronger relationship is predicted between IS scores and scores on other measures of intellectual functioning among Normative children than among Clinical children, based on Porter's (1980) findings.

3. Further, a stronger negative correlation is expected between IS scores and overall intellectual ability than between IS scores and verbal comprehension.

4. It is further predicted that a stronger relationship will be found between DVL scores and overall cognitive functioning among Normative children than among Clinical children. This is based on the finding that reading disabled children obtained higher DVL scores than normal children matched on IQ.
5. It is also expected that a stronger negative correlation will be found between DVL T scores and verbal comprehension ability than between DVL T scores and general intellectual ability.

6. Thus, it is predicted that the abilities of the four scales to reflect intellectual capacity will differ between Normative and Clinical groups. In other words, a different pattern will emerge among the predictors for the Normative group than for the Clinical group. In general, it is expected that a stronger relationship will be found between PIC scores and scores on other intellectual assessment instruments among Normative children than among Clinical children.
CHAPTER II

METHOD

Subjects

The 40 subjects of this investigation were selected from the population of children admitted to an assessment and day treatment centre for preschool children and their families in a Southwestern Ontario city. The sample consisted of 28 males and 12 females between the ages of 32 and 58 months.

Twenty of the subjects were normally developing preschoolers ("Normative" children) selected from the population of children admitted to the regular nursery school program at the centre. Children admitted to this program must meet several criteria. First, they must be between the ages of 2-0 and 6-0. Second, they must obtain a General Cognitive Index which falls within or above the average range on the McCarthy Scales of Children's Abilities (McCarthy, 1972). Third, the scores they achieve on the Reynell Developmental Language Scales (Revised) (Reynell, 1977) and on the Peabody Picture Vocabulary Test (Dunn, 1965) must fall at or above the 50th percentile. In addition, it must be ascertained by the staff speech pathologist that their conversational speech is at an age-appropriate
level, that they can answer questions and follow simple
directions, that their speech is intelligible, and that
there is no evidence of disorder in the physical speech
mechanisms, such as cleft palate or hearing loss. Fourth,
the family functioning must be determined to be non-patholo-
gical by means of a conjoint family interview. During the
interview the child's developmental, medical, social, and
familial histories are explored and family dynamics are
formulated. All families must be headed by two parents and
must have been intact for at least 24 months at the time of
the child's admission. Fifth, the children must not evidence
sensory impairment. Sixth, it must be determined that the
children are performing at or above an age-appropriate level
on the Self-Help scale of the Portage Guide to Early Educa-
tion (Bluma, Shearer, Frohman & Hilliard, 1976).

The remaining subjects were judged to require therapeutic
intervention ("Clinical" children). Children who are admitted
into this treatment program manifest more than one of the
following difficulties: learning disability, speech and
language disorder, emotional disturbance, behavioural
disturbance, developmental delay, radical deprivation;
psychosis, autism, and family disturbance. This information
is obtained through standardized psychological screening
procedures.

These procedures may include a conjoint family inter-
view, a standardized questionnaire containing questions concerning birth history, developmental history, and present behaviour, the Portage Guide to Early Education (Bluma, Shearer, Frohman & Hilliard, 1976), the Peabody Picture Vocabulary Test (Dunn, 1965), the Reynell Developmental Language Scales (Revised) (Reynell, 1977), the Utah Test of Language Development (Mecham, Jex & Jones, 1967), the Mariâne Frostig Developmental Test of Visual Perception (Frostig, 1966), the McCarthy Scales of Children's Abilities (McCarthy, 1972), the Bene-Antony Family Relations Test (Bene & Anthony, 1957), and the Stanford-Binet Intelligence Scale (Terman & Merrill, 1973). Children are accepted into the treatment program at the centre on the basis of the severity of their difficulties and the number of presenting problems (i.e., more than one).

The Normative and Clinical groups were matched on the basis of age and sex. The mean age of each group was 42 months and there were 14 boys and 6 girls in each group. Socio-economic status (SES) of each household's highest income earner was estimated based on Blishen's (1971) scale. The mean SES of the Normative and Clinical groups were estimated to be 54.41 and 37.37, respectively. All children in the Normative group lived with two parents. Four of the children in the Clinical group lived with one parent, while the remaining sixteen lived with two.
Children determined to have defective hearing or vision on the basis of their medical records and/or ophthalmological examinations were excluded from the subject sample. Also excluded were children who had suffered traumatic brain injury or severe environmental deprivation. All subjects spoke English as their primary language.

Test Measures

The McCarthy Scales of Children's Abilities (MSCA: McCarthy, 1972) was designed to assess the intellectual functioning of children 2½ through 8½ years of age. It evaluates their general intellectual level as well as their areas of strength and weakness. Scores are provided for six scales: Verbal, Perceptual-Performance, Quantitative, Memory, Motor, and General Cognitive. When the tests constituting the first four scales are taken together, they form the General Cognitive Scale, which provides a measure of a child's overall cognitive functioning. The scale score obtained is called an Index. The General Cognitive Index (GCI) has a mean which has been set at 100 and a standard deviation of 15.

Split-half reliability coefficients ($r$) for the General Cognitive Scale ranged from .90 to .96 with a mean of .93 for the standardization sample ($N=1032$). The mean test-retest reliability coefficient ($r$) after a period of
one month was .90, with a range of .89 to .91 for the General Cognitive Scale (N=125). In a sample of 35 children aged 6 to 6½, the GCI correlated .81 with the Stanford-Binet IQ and .62 to .71 with the three Wechsler Preschool and Primary Scale of Intelligence (WPPSI) IQ's. Thirty-one of these children were tested four months later with the Metropolitan Achievement Tests, Primary 1, Form F. The GCI correlated significantly with the Reading, Mathematics, Total Reading and Total Raw scores (range: .43 to .54).

The Peabody-Picture Vocabulary Test (PPVT: Dunn; 1965) is designed to provide an estimate of the verbal intelligence of subjects 2½ through 40 years of age by measuring their receptive vocabulary. The subject is not required to read, write, or speak, but rather to make a gestural response to a verbal stimulus. He is instructed to indicate which picture out of a group of four best represents the stimulus word which is said by the examiner. The subject's raw score is converted to a standard score which has a mean set at 100 and a standard deviation of 15.

The test manual (Dunn, 1965) describes the methods used for item selection, standardization, and establishment of norms. Alternate form reliability coefficients (r) ranged from .64 to .84 with a median of .77 for 4,012 subjects between 2-6 and 18-0 years of age. PPVT mental age scores were found to correlate with 1937 Stanford-Binet
mental age scores over the range of .60 to .87 with a median of .71. Mental age correlations with the 1960 Stanford-Binet have ranged from .82 to .86 with a median of .83. Correlations between PPVT IQ's and 1937 Stanford-Binet IQ's have ranged from .43 to .92 with a median of .71. PPVT IQ scores have correlated with the WISC Full Scale IQ over the range .30 to .84 with a median of .61; with the WISC Verbal IQ over the range .41 to .74 with a median of .67; with the WISC Performance IQ over the range .19 to .82 with a median of .39. Correlations between PPVT scores and measures of scholastic achievement, such as the Wide Range Achievement Test (WRAT), the Metropolitan Achievement Tests (MAT), Sequential Tests of Educational Progress (STEP), California Achievement Tests (CAT), Stanford Achievement Tests (SAT), and the Gray-Votaw-Rogers Achievement Tests have ranged from .04 to .91 with a median of .50.

The test measures under investigation in this study were the Achievement, Intellectual Screening, and Development PIC profile scales and Factor Scale IV: Cognitive Development.

Procedure

The MSCA and the PPVT are administered to all children as they are screened for admission to the centre. The original 500-item form of the PIC is routinely completed by
all parents of children who have been admitted to the Clinical or Normative programs within 21 days of being notified of their child's admission. The inventory is usually completed at the centre. However, parents are permitted to complete it at home, if necessary. Instructions are given following the directions provided in the manual (Appendix A).

All MSCA and PIC (original form) protocols used in the present study were scored by trained Psychology staff and all PPVT's were scored by the staff Speech Pathologist. All PIC protocols used in this study were re-scored by the investigator to obtain scores on Scale IV: Cognitive Development. Only those PIC's that were completed by mothers were employed in this study.

The criteria by which concurrent validity of the PIC measures was determined was each subject's General Cognitive Index on the MSCA and his or her IQ obtained on the PPVT. These tests also permitted an examination of the relationships between PIC scores, verbal comprehension ability, and overall intellectual functioning.

A correlational design was employed. Pearson product moment correlation coefficients (r) were calculated between each predictor (ACH, IS, DVL, Scale IV) and each criterion (GGI, IQ). Coefficients were also computed between each of these six variables and group membership, age, SES, number
of parents, and sex to determine their relative contributions to the variance in the intellectual scales.

Three such correlation matrices were generated using the Statistical Analysis System (SAS: Helwig & Council, 1979): one for the entire subject sample (N=40) and one for each of the Normative (n=20) and Clinical (n=20) groups. This was carried out to determine the effects of group membership on the correlations.

In order to investigate the relative abilities of the various PIC scales to predict general intellectual functioning and receptive vocabulary, a multiple regression analysis was performed using the Statistical Analysis System (SAS: Helwig & Council, 1979). The General Linear Models procedure was employed to generate Type I and Type.IV Sums of Squares. To test for the effects of the intercorrelations among the variables, the independent variables were entered into the analysis in various combinations. An additional regression analysis was performed using the Stepwise Maximum R-Square procedure. This procedure generated the best models of a given size for predicting the dependent variables.

These regression analyses were carried out once for the entire subject sample (N=40), once for the Normative group (n=20), and once for the Clinical group (n=20) to examine the effects of group membership on the abilities of the broad- and narrow-band PIC scales to predict cognitive functioning as measured by intelligence tests.
CHAPTER III

RESULTS

The results of the analyses will be presented in three general sections: (1) the descriptive statistics; (2) the correlational analyses; and (3) the regression analyses.

Descriptive Statistics

The mean, standard deviation, and minimum and maximum values are presented in Table 1 for each of the variables employed in this study, based on the full sample of 40 children. Tables 2 and 3 present the statistics for each of these measures for the Normative and Clinical groups, respectively.

The Normative and Clinical groups differed significantly on all of the six intellectual measures. The mean ACH score of the Normative group was 49.9, while the mean ACH score of the Clinical group was 73.85. The Normative group obtained a mean IS score of 57.20 and the mean IS score of the Clinical group was 76.20. For the DVL scale, the mean of the Normative group was 50.40, while the mean of the Clinical group was 72.25. On Scale IV, the Normative group obtained a mean of 5.75 and the Clinical group obtained a mean of 12.15. The mean GCI of the Normative group was found to be 112.3, while
TABLE 1

Descriptive Statistics for Sample of Children (N=40)

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum Value</th>
<th>Maximum Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age(^a)</td>
<td>41.90</td>
<td>6.52</td>
<td>32.00</td>
<td>58.00</td>
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<td>SES</td>
<td>45.89</td>
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</tr>
<tr>
<td>Number of Parents</td>
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<td>0.30</td>
<td>1.00</td>
<td>2.00</td>
</tr>
<tr>
<td>ACH</td>
<td>61.88</td>
<td>18.31</td>
<td>40.00</td>
<td>112.00</td>
</tr>
<tr>
<td>IS</td>
<td>66.70</td>
<td>13.93</td>
<td>51.00</td>
<td>112.00</td>
</tr>
<tr>
<td>DVL</td>
<td>61.33</td>
<td>17.53</td>
<td>36.00</td>
<td>112.00</td>
</tr>
<tr>
<td>Scale IV</td>
<td>8.95</td>
<td>4.52</td>
<td>3.00</td>
<td>22.00</td>
</tr>
<tr>
<td>McCarthy GCI</td>
<td>99.93</td>
<td>18.95</td>
<td>62.00</td>
<td>136.00</td>
</tr>
<tr>
<td>PPVT IQ</td>
<td>98.83</td>
<td>21.61</td>
<td>62.00</td>
<td>134.00</td>
</tr>
</tbody>
</table>

\(^a\) age in months
### TABLE 2

Descriptive Statistics for Normative Group (n=20)

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Mean</th>
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<th>Minimum Value</th>
<th>Maximum Value</th>
</tr>
</thead>
<tbody>
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<td>35.00</td>
<td>54.00</td>
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<tr>
<td>SES</td>
<td>54.41</td>
<td>14.86</td>
<td>28.96</td>
<td>75.41</td>
</tr>
<tr>
<td>Number of Parents</td>
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<td>0.00</td>
<td>2.00</td>
<td>2.00</td>
</tr>
<tr>
<td>ACH</td>
<td>49.90</td>
<td>7.14</td>
<td>40.00</td>
<td>66.00</td>
</tr>
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<td>IS</td>
<td>57.20</td>
<td>4.79</td>
<td>51.00</td>
<td>67.00</td>
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<td>DVL</td>
<td>50.40</td>
<td>9.57</td>
<td>36.00</td>
<td>77.00</td>
</tr>
<tr>
<td>Scale IV</td>
<td>5.75</td>
<td>1.77</td>
<td>3.00</td>
<td>9.00</td>
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<tr>
<td>McCarthy GCI</td>
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<td>14.12</td>
<td>92.00</td>
<td>136.00</td>
</tr>
<tr>
<td>PPVT IQ</td>
<td>114.65</td>
<td>11.21</td>
<td>87.00</td>
<td>134.00</td>
</tr>
</tbody>
</table>
TABLE 3

Descriptive Statistics for Clinical Group (n=20)

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum Value</th>
<th>Maximum Value</th>
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</thead>
<tbody>
<tr>
<td>Age</td>
<td>41.55</td>
<td>6.94</td>
<td>32.00</td>
<td>68.00</td>
</tr>
<tr>
<td>SES</td>
<td>37.37</td>
<td>12.00</td>
<td>27.00</td>
<td>70.14</td>
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<tr>
<td>Number of Parents</td>
<td>1.80</td>
<td>0.41</td>
<td>1.00</td>
<td>2.00</td>
</tr>
<tr>
<td>ACH</td>
<td>73.85</td>
<td>18.31</td>
<td>50.00</td>
<td>112.00</td>
</tr>
<tr>
<td>IS</td>
<td>76.20</td>
<td>13.62</td>
<td>52.00</td>
<td>112.00</td>
</tr>
<tr>
<td>DVL</td>
<td>72.25</td>
<td>16.97</td>
<td>41.00</td>
<td>112.00</td>
</tr>
<tr>
<td>Scale IV</td>
<td>12.15</td>
<td>4.16</td>
<td>6.00</td>
<td>22.00</td>
</tr>
<tr>
<td>McCarthy GCI</td>
<td>87.55</td>
<td>14.69</td>
<td>62.00</td>
<td>119.00</td>
</tr>
<tr>
<td>PPVT IQ</td>
<td>83.00</td>
<td>17.49</td>
<td>62.00</td>
<td>124.00</td>
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</tbody>
</table>
that of the Clinical group was 87.55. The mean PPVT IQ of the Normative group was 114.65 and that of the Clinical group was found to be 83.00.

The groups also differed on SES and number of parents (p<.05). Table 4 contains the t value, degrees of freedom, and probability level for each of the measures.

**Correlational Analysis**

Pearson product moment correlations (r) were calculated using age, SES, number of parents, sex, and scores on the six intellectual measures. The correlation coefficients for the intellectual measures within the total subject sample are presented in Table 5. Tables 6 and 7 contain the correlation coefficients for the intellectual measures within the Normative and Clinical groups, respectively. The correlation coefficients for the other independent variables are presented in Appendix B.

An examination of Table 5 reveals that all of the 36 correlations were significant for the entire sample (p<.05). Each of the four PIC scales correlated negatively and significantly with each of the criterion measures (p<.05). ACH scores were found to correlate -.49 with McCarthy GCI and -.57 with PPVT IQ. IS scores correlated -.51 with McCarthy GCI and -.54 with PPVT IQ. Correlations of -.55 between DVL scores and McCarthy GCI, and -.65 between DVL scores and
TABLE 4

Results of t Tests for Sample of Children \(N=40\)

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>t Value</th>
<th>df</th>
<th>Prob &gt;</th>
<th>t</th>
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</tr>
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<td>0.336</td>
<td>38.0</td>
<td>0.739</td>
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<tr>
<td>SES</td>
<td>3.989</td>
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<td>Number of Parents</td>
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<td>0.036</td>
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<tr>
<td>Sex</td>
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<td>1.000</td>
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<td></td>
</tr>
<tr>
<td>ACH</td>
<td>-5.451</td>
<td>38.0</td>
<td>0.0001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IS</td>
<td>-5.887</td>
<td>38.0</td>
<td>0.0001</td>
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<tr>
<td>DVL</td>
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<td>38.0</td>
<td>0.0001</td>
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<tr>
<td>Scale IV</td>
<td>-6.331</td>
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<td>0.0001</td>
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<tr>
<td>McCarthey GCI</td>
<td>5.433</td>
<td>38.0</td>
<td>0.0001</td>
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<tr>
<td>PPVT IQ</td>
<td>6.813</td>
<td>38.0</td>
<td>0.0001</td>
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</table>


**TABLE 5**

Correlation Coefficients for Sample of Children (N=40)

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>ACH</th>
<th>IS</th>
<th>DVL</th>
<th>Scale IV</th>
<th>McCarthy GCI</th>
<th>PPVT IQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>.662***</td>
<td>.691***</td>
<td>.631***</td>
<td>.717***</td>
<td>-.661***</td>
<td>-.742***</td>
</tr>
<tr>
<td>ACH</td>
<td>.669***</td>
<td>.817***</td>
<td>.742***</td>
<td>-.492**</td>
<td>-.566***</td>
<td></td>
</tr>
<tr>
<td>IS</td>
<td>.669***</td>
<td>.777***</td>
<td>.808***</td>
<td>-.507**</td>
<td>-.541**</td>
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</tr>
<tr>
<td>DVL</td>
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<td>.777***</td>
<td>.913***</td>
<td>-.549**</td>
<td>-.654***</td>
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</tr>
<tr>
<td>Scale IV</td>
<td>.742***</td>
<td>.808***</td>
<td>.913***</td>
<td></td>
<td>-.527**</td>
<td>-.629***</td>
</tr>
<tr>
<td>McCarthy GCI</td>
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<td>-.507**</td>
<td>-.549**</td>
<td>-.527**</td>
<td></td>
<td>.696***</td>
</tr>
<tr>
<td>PPVT IQ</td>
<td>-.566***</td>
<td>-.541**</td>
<td>-.654***</td>
<td>-.629**</td>
<td>.696***</td>
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</tr>
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**p<.05**

***p<.0001**
TABLE 6

Correlation Coefficients for Normative Group (n=20)

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>ACH</th>
<th>IS</th>
<th>DVL</th>
<th>Scale IV</th>
<th>McCarthy GCI</th>
<th>PPVT IQ</th>
</tr>
</thead>
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<td>ACH</td>
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<td>.662*</td>
<td>.547*</td>
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<td>.225</td>
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<td>.082</td>
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<td>.052</td>
<td>.279</td>
<td>.069</td>
<td>.260</td>
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<tr>
<td>DVL</td>
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<td>.052</td>
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<td>.726**</td>
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<td>.151</td>
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<tr>
<td>Scale IV</td>
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<td>.279</td>
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<td></td>
<td>-.096</td>
<td>.501*</td>
</tr>
<tr>
<td>McCarthy GCI</td>
<td>-.006</td>
<td>.069</td>
<td>-.197</td>
<td>-.096</td>
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<td>.257</td>
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<tr>
<td>PPVT IQ</td>
<td>.225</td>
<td>.260</td>
<td>.151</td>
<td>.501*</td>
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<td>.257</td>
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</tbody>
</table>

*p < .05

**p < .001
TABLE 7

Correlation Coefficients for Clinical Group (n=20)

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>ACH</th>
<th>IS</th>
<th>DVL</th>
<th>Scale IV</th>
<th>McCarthy GCI</th>
<th>PPVT IQ</th>
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<tbody>
<tr>
<td>ACH</td>
<td>.433</td>
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<td>DVL</td>
<td>.701**</td>
<td>.730**</td>
<td>.888***</td>
<td>-.255</td>
<td>-.543*</td>
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</tr>
<tr>
<td>Scale IV</td>
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<td>.674**</td>
<td>.888***</td>
<td>-.115</td>
<td>-.407</td>
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<tr>
<td>McCarthy GCI</td>
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<td>-.161</td>
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<td>-.115</td>
<td>.515*</td>
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<tr>
<td>PPVT IQ</td>
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<td>-.134</td>
<td>-.543*</td>
<td>-.407</td>
<td>.515*</td>
<td></td>
</tr>
</tbody>
</table>

*p<.05

**p<.001

***p<.0001
PPVT IQ were found. Scores on Scale IV correlated \(-.53\) with McCarthy GCI and \(-.63\) with PPVT IQ.

When examined separately, the relationships among the variables within the Normative group differ somewhat from those among the entire subject sample. No significant negative correlations were found between the PIC scales and the criterion measures \((p > .05)\). No relationships were evident between any of the intellectual measures and age, SES, number of parents, or sex \((p > .05)\).

The findings were similar among the Clinical group. None of the PIC scales correlated significantly with McCarthy GCI \((p > .05)\). Of the PIC scales, only DVL was found to be significantly and negatively related to PPVT IQ \((r = -.54, \ p < .05)\). None of the intellectual measures correlated significantly with age or number of parents. SES correlated significantly with ACH \((r = -.61, \ p < .005)\) and with DVL \((r = -.51, \ p < .05)\). A relationship was also found between sex and ACH \((r = .48, \ p < .05)\).

Group membership correlated strongly with all of the six intellectual measures \((p < .05)\).

The strongest relationship existed between Scale IV and DVL in the total subject sample \((r = .91, \ p < .001)\), in the Normative group \((r = .73, \ p < .05)\), and in the Clinical group \((r = .89, \ p < .001)\).

The correlation between ACH and PPVT IQ \((r = -.57)\) was slightly higher than that between ACH and McCarthy GCI.
(r = -.49) in the total sample. However, the difference between these coefficients proved to be non-significant, using Student's t test for correlation coefficients of dependent samples (Hinkle, Wiersma, & Jurs, 1979, p. 226). The correlations between IS and McCarthy GCI (r = -.51) and IS and PPVT IQ (r = -.54) in the entire sample were not found to be significantly different. The relationship between DVL and PPVT IQ (r = -.65) was slightly stronger than that between DVL and McCarthy GCI (r = -.55) in the total sample, but this difference was not found to be significant.

SES was found to correlate with the cognitive measures (p < .05), with the exception of McCarthy GCI (p > .05). No significant relationships were evident between any of the intellectual measures and age, number of parents, or sex (p > .05).

Regression Analyses

General Linear Models (GLM) and Stepwise regression procedures were employed:

Prediction of GCI within the total subject sample. The best predictor of McCarthy GCI for the sample as a whole was found to be group membership (F = 25.52, df = 1, p < .0001). It accounted for 43.7% of the variance in GCI when used as the sole predictor (p < .0001). When all of the independent variables were included in the equation, $R^2$ was not significantly increased ($R^2 = .516$), although the model as a whole
was significant \( (F=3.55, \text{df}=9, 30; p < .005) \).

As would be expected from the correlations, each of the PIC scales was a significant predictor of GCI for the total sample when it was the only variable in the model. ACH accounted for 24.1% of the variance \( (F=12.11, \text{df}=1, p < .005) \), IS accounted for 25.7% \( (F=13.17, \text{df}=1, p < .001) \), DVL accounted for 30.2% \( (F=16.42, \text{df}=1, p < .0005) \), and Scale IV accounted for 27.8% \( (F=14.64, \text{df}=1, p < .001) \). Thus, of the PIC scales, DVL was the best predictor of GCI. The addition of any one or more PIC scales to any of these models did not significantly increase \( R^2 \), reflecting their overlapping variances and high intercorrelations. The inclusion of group membership in any of these models indicated that it is consistently the best predictor of GCI.

Prediction of IQ within the total subject sample. Group membership was also the best predictor of PPVT IQ for the entire sample \( (F=46.42, \text{df}=1, p < .0001) \). When it was the sole variable in the model, it accounted for 55% of the variance in IQ \( (p < .0001) \). The only other variable which contributed to a significant increase in \( R^2 \) was DVL, as expected from the correlations. The Stepwise Maximum R-Square procedure indicated that the addition of variables to the group membership and DVL model does not significantly increase \( R^2 \) any further. Thus, when all of the independent variables were included in the equation, \( R^2 \) was not significantly increased as compared to the Group-DVL model, although the model as a whole was
significant ($F=6.43$, $df=9,30$; $p<.0001$).

As the correlations suggested, each of the PIC scales was a significant predictor of IQ for the total sample when it was the only variable in the model. ACH accounted for 32.1% of the variance ($F=17.92$, $df=1$, $p<.0001$), IS accounted for 29.3% ($F=15.73$, $df=1$, $p<.0003$), DVL accounted for 42.8% ($F=28.47$, $df=1$, $p<.0001$), and Scale IV accounted for 39.6% ($F=24.88$, $df=1$, $p<.0001$). Thus, DVL was the best predictor of IQ among the PIC scales.

An examination of various two-variable models revealed that $R^2$ is significantly increased when ACH is accompanied by DVL ($R^2=.431$, $F=7.21$, $df=1$, $p<.05$) or Scale IV ($R^2=.413$, $F=6.17$, $df=1$, $p<.05$). $R^2$ is also increased when IS is accompanied by ACH ($R^2=.368$, $F=4.42$, $df=1$, $p<.05$), or DVL ($R^2=.431$, $F=8.98$, $df=1$, $p<.005$), or Scale IV ($R^2=.399$, $F=6.52$, $df=1$, $p<.05$). The inclusion of another PIC variable with DVL or Scale IV did not significantly increase $R^2$.

These relationships reflect the relative sizes of the correlations between each of the PIC scales and IQ, with DVL being the most highly correlated ($r=-.629$), followed by Scale IV ($r=-.655$), ACH ($r=-.566$), and IS ($r=-.541$).

An examination of various three-variable models reveals that these relationships were generally maintained with the addition of a third variable. The model which accounted for the greatest amount of variance in IQ included ACH, DVL, and
Scale IV \( (R^2 = .437, p < .0001) \).

Group membership was consistently the best predictor of IQ.

**Prediction of GCI within the Normative group.** None of the independent variables met the .05 significance level for entry into the prediction equation. Further, none of the models as a whole significantly predicted GCI. This reflects the absence of correlations between any of the independent variables and GCI. The Stepwise Maximum \( R \)-Square procedure indicated that the best individual predictor of GCI among the Normative group is SES and the best two-variable model includes SES and age. However, neither of these variables met the .05 significance level for entry into the regression equation.

**Prediction of IQ within the Normative group.** As would be expected from the correlations, none of the PIC measures predicted IQ individually or in combination, with one exception. In a four-variable model including SES, sex, DVL, and Scale IV, a significant increase in \( R^2 \) was made by DVL \( (F = 5.57, df = 1, p < .05) \). This model was significant at the .05 level. DVL also contributed significantly to \( R^2 \) when IS was added to the model. However, DVL was not a significant predictor in any other model. In light of DVL's low correlation with IQ \( (r = .151) \), it appears that it is not an effective predictor by itself, but rather it predicts in interaction with the other variables in the models described.
This interaction produces the variance increment which causes DVL to enter the models. However, when age enters the model, DVL no longer contributes significantly to $R^2$, suggesting that age and DVL share much of the same variance.

The only equation involving only PIC scales as independent variables which predicted IQ as a whole, aside from Scale IV in a one-variable model, was a two-variable model including Scale IV and DVL ($R^2 = .347, p < .05$).

**Prediction of GCI within the Clinical group.** As the correlations would indicate, none of the independent variables was found to be a significant predictor of GCI among the Clinical group. The Stepwise Maximum R-Square procedure indicated that of the best models generated, none met the .05 level of significance. This analysis demonstrated that sex is the best single predictor of GCI and the best two-variable model includes sex and ACH, but neither of these models predicted significantly.

**Prediction of IQ within the Clinical group.** The best single predictor of IQ was found to be DVL ($R^2 = .295, p < .05$) and the best two-variable model included DVL and IS ($R^2 = .442, p < .01$). These two variables were consistently the best predictors in any model generated. Based on the correlations obtained, it would be expected that DVL would be the best predictor of IQ, since it is the only independent variable which correlated significantly with IQ ($r = -.549, p < .05$). The second highest correlation was obtained between Scale IV
and IQ ($r = -.407, p > .05$), but Scale IV was not found to contribute significantly to $R^2$ in any of the equations generated, reflecting the overlapping variance between Scale IV and DVL. Since IS had a much lower correlation with IQ ($r = -.134$), its significant contribution to $R^2$ suggests an interaction with DVL. This is reflected by its high correlation with DVL ($r = .73, p < .001$). Thus, despite the strong relationship between DVL and IS, IS makes a unique contribution to the variance in IQ when it is employed in conjunction with DVL.

The model which accounted for the largest amount of variance while meeting the .05 significance level was a six-variable model which included SES, sex, ASH, IS, DVL, and Scale IV ($R^2 = .617, p < .05$).
CHAPTER IV

DISCUSSION

The purpose of the present study was to evaluate the validity of the broad- and narrow-band intellectual scales of the Personality Inventory for Children among normative and clinical preschool age children. A second purpose was to examine the relative merits of the broad- and narrow-band intellectual scales as screening measures for these children.

Correlation and regression analyses were employed in an attempt to determine the relationships between the intellectual scales of the PIC and criterion measures of cognitive abilities, namely the McCarthy Scales of Children's Abilities and the Peabody Picture Vocabulary Test. These analyses were carried out for samples of twenty normative children and twenty clinical children, as well as for the entire group of forty children in order to examine the differential effects of group membership on the findings.

In this chapter, the findings related to the concurrent validity of the PIC scales will be reviewed. This will be followed by an evaluation of the expectations of the study. The limitations of the methodology employed will then be discussed. Finally, a summary of the study will be presented and final conclusions will be drawn.

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Concurrent Validity of the Intellectual Scales of the PIC

Group membership was found to have a powerful influence on the relationships between the variables. In other words, each of these measures is able to differentiate between normative and clinical preschoolers. Thus, the PIC intellectual scales may be said to have considerable discriminative validity for this age group.

In terms of concurrent validity, examination of the correlations between each PIC scale and each criterion measure for the entire sample revealed that the PIC scales are indeed valid for a heterogeneous population. Thus, they would appear to be effective in screening for intellectual difficulties among preschool children.

The scale which provided the most accurate reflection of overall intellectual capacity was DVL. In fact, its accuracy was not significantly increased when it was accompanied by any or all of the remaining PIC scales. Thus, DVL appears to be the most effective intellectual screening measure for preschool children, followed closely by Scale IV.

The DVL scale was also the best predictor of receptive vocabulary. Again, the information it provided was not improved upon significantly by the addition of one or more of the other PIC scales to the battery. Thus, although each of the four PIC scales reflects strengths and weaknesses in overall capability and in language-related abilities, DVL does this most effectively, followed again by Scale IV.
The absence of significant negative correlations between any of the PIC scales and McCarthy GCI or PPVT IQ among the normative group does not necessarily deny their validity for these children. Due to the high degree of homogeneity among this group's scores, it would be very difficult to obtain significant correlations within a sample of this size. It should be noted that none of these children had receptive language difficulties. Thus, the significant positive correlation obtained between Scale IV and PPVT IQ is likely a statistical anomaly, since none of the children in this group had below-average PPVT scores.

Since, in terms of McCarthy GCI, the Clinical group is fairly homogeneous as well, the absence of relationships between the PIC scales and GCI is not surprising and does not necessarily deem them invalid. However, the greater heterogeneity among this group's PPVT scores allowed some relationships to emerge.

For this group of children, DGL is the best single predictor of receptive language difficulties. Thus, a high DGL score may signal to the examiner the need for further language-related assessment. The ability to predict such a deficiency based on a child's DGL score is enhanced by knowledge of his IS score. Thus, high scores on each of these scales would suggest the possibility of verbal learning difficulties. The most effective battery for screening for such problems includes the four PIC scales and knowledge of the
child's sex and socioeconomic status.

Evaluation of Expectations

A number of expectations were formulated based on past studies of school age children.

Primary hypotheses. 1. It was predicted that scores on the four PIC intellectual scales would correlate negatively and significantly with scores on individual intellectual assessment instruments. This hypothesis was strongly supported within a heterogeneous sample.

2. The prediction that Scale IV and the DVL scale would perform in a similar manner was supported. These scales obtained the highest intercorrelation of all the intellectual measures within the Normative and Clinical groups and in the sample as a whole.

Secondary hypotheses. 1. It was expected that the ACH scale would more strongly reflect verbal comprehension ability than overall intellectual capacity. This hypothesis was not supported, although a trend in this direction was suggested.

2. A stronger relationship between IS scores and the criterion measures was expected among the Normative group than among the Clinical children. Since none of these correlations was found to be significant, this hypothesis cannot be evaluated.

3. It was predicted that the IS scale would have a stronger relationship to overall ability than to receptive
language ability. This hypothesis was not supported.

4. The expectation that DVL scores would more accurately reflect general intellectual functioning among Normative children than among Clinical children could not be evaluated, since neither of these correlations was found to be significant.

5. A stronger relationship was predicted between DVL scores and verbal comprehension ability than between DVL scores and overall cognitive capability. This hypothesis was not supported among the sample as a whole, although a trend in this direction was indicated. Neither of these relationships was significant among the Normative group. Within the Clinical group, however, there was a significant relationship between DVL and verbal comprehension, while the relationship between DVL and overall ability was not significant. However, this difference was not found to be statistically significant.

6. The hypothesis that a stronger relationship would be found between the PIC scales and scores on other intellectual measures among Normative children than among Clinical children was not supported.

Methodological Limitations

Two characteristics of the samples employed in the present study indicate that the findings should be generalized cautiously. These are the size and homogeneity of the Normative
and Clinical samples utilized. These two factors have contributed to truncated ranges of the data, making generalization of the findings to other populations difficult. The Normative children employed in this study all fell within or above the average range on the criterion measures utilized. It is likely, then, that they are not truly representative of the group of children which constitutes what is generally referred to as the "normal population".

The Clinical group was also found to be fairly homogeneous in terms of overall intellectual capacity, although they were relatively quite heterogeneous on the PIC measures. This reflects the fact that these children have a variety of problems in addition to learning difficulties. Thus, although they may be fairly representative of the population of "children in treatment", their heterogeneity in terms of diagnoses creates difficulties in interpretation of the findings.

The small sample sizes of this study are also limiting. Evidence of significant relationships is difficult to obtain and generalizability is restricted.

A consideration of the effects of socioeconomic status and number of parents, which differed between groups, is also important. Socioeconomic status correlated significantly with each of the intellectual measures, although it was not a significant predictor of any of them. Number of parents had no relationship to any of the cognitive measures. The difference
in socioeconomic status between the Normative and Clinical groups may well reflect a real difference in the population. Nevertheless, it may be impacting upon the children's scores in some way.

Finally, the parents of the subjects employed in this study completed the PIC following their children's admission to either the Normative or Treatment program. Therefore, it was impossible for the examiners who administered the McCarthy and the PPVT to be influenced by a child's PIC scores. However, it is possible that the reverse may have occurred. That is, a parent who has been informed of his or her child's admittance into a Normative or Treatment program may be influenced by that knowledge to view the child's behaviour in a particular way. This perception, in turn, may impact upon the parent's responses to the items of the PIC. A superior strategy would involve administering the PIC and the other intellectual measures simultaneously and scoring the PIC after the other tests have been interpreted.

Summary and Conclusions

The two primary hypotheses of this study were strongly supported by the findings. Thus, the intellectual scales of the PIC correlated negatively and significantly with individual intellectual assessment instruments within a heterogeneous sample. Further, the DVL scale and Scale IV consistently obtained the highest intercorrelation of all the intellectual
measures in the Normative and Clinical groups and in the entire subject sample. None of the six secondary hypotheses received support.

Therefore, the broad-band and narrow-band intellectual scales of the PIC do appear to have considerable concurrent validity for a heterogeneous preschool population. The narrow-band DVL scale was found to be the best predictor or both overall cognitive functioning and verbal comprehension ability. Thus, it is potentially very useful as a screening instrument for preschoolers. Scale IV of the broad-band scales followed DVL closely in its ability to identify children with learning difficulties. In light of these findings, it appears that the broad-band scale is as effective a screening device as are the narrow-band scales.

The results of this study point to the need for further research within a more heterogeneous normative sample and a more homogeneous (in terms of diagnosis) clinical sample. In addition to providing further information regarding the utility of the PIC scales within these groups, such research may elucidate the relationship between Scale IV and verbal comprehension ability among normative preschool children.

The need for an item analysis of the intellectual scales of the PIC was also raised by this investigation. The reason for DVL's superior ability to predict learning difficulties
relative to that of the IS scale is not clear. This may relate to the heterogeneity of the Clinical sample or perhaps the IS scale is less relevant to a preschool population.

An additional area which merits study is the effect of age on the validity of the intellectual scales of the PIC. Given what is known about the vast differences in cognitive abilities between two-year-olds and six-year-olds, it would appear that an investigation of the possible need for separate norms for two-, three-, four-, five-, and six-year-olds is warranted.

Finally, further investigation of the remaining broad-band scales in terms of their usefulness for preschoolers relative to that of the narrow-band scales is needed. Based on the findings of the present study, the broad-band scales would seem to show promise as a fairly rapid screening instrument for preschool children. Their brevity and provision of scores in the areas of cognition and personality make them potentially extremely useful to clinicians and educators in their work with young children.
APPENDIX A

DIRECTIONS FOR ADMINISTERING THE INVENTORY

"Here are a booklet and an answer sheet. The booklet contains 600 items which can be answered as True or False, depending on your opinion of your child's behaviour. Please try to answer all of the items and don't spend too much time on any one item. Please do not mark on the booklet, but mark your answers on the answer sheet.

"The answer sheet is printed on both sides of this sheet of paper. It contains spaces for identification information, which I would like you to fill in. There is also a list of item numbers corresponding to the numbers in the booklet and next to them are double columns of boxes labelled T, for true, and F, for false. Please fill in whichever box (T or F) best fits your opinion."
APPENDIX B

Correlation Coefficients for Sample of Children (N=40)

<table>
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<th>Variable Name</th>
<th>Group</th>
<th>Age</th>
<th>SES</th>
<th>Number of Parents</th>
<th>Sex</th>
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<td>.137</td>
<td>.036</td>
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<td>.298</td>
<td>-.146</td>
<td></td>
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<tr>
<td>Sex</td>
<td>.000</td>
<td>.036</td>
<td>-.148</td>
<td>-.146</td>
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<tr>
<td>ACH</td>
<td>.662***</td>
<td>-.023</td>
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<td>McCarthy GCI</td>
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<td>.424*</td>
<td>.255</td>
<td>.088</td>
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*p<.05

**p<.001

***p<.0001
APPENDIX C

ITEM OVERLAP AMONG THE PIC INTELLECTUAL SCALES, EXPECTED INTERCORRELATIONS DUE TO ITEM OVERLAP, AND ACTUAL INTERCORRELATIONS

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<thead>
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<th>Scale</th>
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<th>DVL</th>
<th>Scale IV</th>
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<td>15</td>
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<td>.87</td>
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Based on a heterogeneous clinical sample (n=764)

Based on a male clinic sample (n=816) and a female clinic sample (n=410)
APPENDIX D

ITEMS COMPRISING THE NARROW-BAND AND BROAD-BAND INTELLECTUAL SCALES OF THE PIC

The Achievement Scale (ACH)

50. Other children don't seem to listen to or notice my child much. (F)

56. My child has little self-confidence. (T)

63. My child could do better in school if he (she) tried. (T) (DVL, IS)

73. Now and then my child writes letters to friends. (F) (DVL, Scale IV)

113. I can't get my child to do his (her) school lessons. (T) (DVL)

121. Others think my child is talented. (F) (DVL, Scale IV)

134. My child is good at leading games and things. (F)

206. My child seems shy with the opposite sex. (T)

224. Sometimes I worry about my child's lack of concern for others' feelings. (F)

230. My child doesn't seem to be interested in practical things. (T)

234. My child can't seem to keep attention on anything. (T)
237. My child gives in too easily. (T)

254. School has been easy for my child. (F) (DVL)

267. Reading has been a problem for my child. (T) (DVL, Scale IV)

294. My child is in a special class in school (for slow learners). (T) (IS, DVL, Scale IV)

311. My child's favorite stories are fairy tales or nursery rhymes. (T) (IS)

343. Reading is my child's favorite pastime. (F) (DVL)

368. My child will usually admit being wrong. (T)

390. Others often remark how sensible my child is. (F)

394. My child seems to understand everything that is said. (F) (DVL)

395. My child will do anything on a dare. (T)

432. My child has more accidents resulting in cuts, bruises, and broken bones than most children. (T)

452. My child can count change when buying something. (F) (IS, DVL, Scale IV)

457. My child shows unusual talent. (F) (DVL)

465. Many times my child has become violent. (T)

481. My child is rather absent minded. (F)

502. My child will never clean his (or her) room. (T)
510. The child's father gets along fine with the child. (F)

533. My child could eat with a fork before age four years.
   (F) (DVL, Scale IV)

542. My child refuses to do anything around the house. (T)

595. Others have remarked how smart my child is. (F) (DVL, Scale IV)

The Intellectual Screening Scale (IS)

2. My child seems average or above average in intelligence.
   (F) (DVL)

36. My child has had to have drugs to relax. (T)

43. My child sometimes sees things that aren't there. (F)

63. My child could do better in school if he (she) tried.
   (F) (ACH, DVL)

79. My child has had convulsions. (T)

85. Most of my child's friends are younger than he (she) is. (T)

106. My child seems bored with school. (F)

120. Sometimes my child runs errands for me. (T)

145. My child is different than most children. (T)

149. At one time my child had speech difficulties. (T)

154. My child believes in God. (T)
155. My child can cut things with scissors as well as can others of his (her) age. (F) (DVL)

164. My child doesn't seem to care to be with others. (F)

167. My child has difficulty doing things with his (her) hands. (T)

186. My child can be left home alone without danger. (F)

209. My child often tells jokes. (F)

288. My child has never failed a grade in school. (F) (DVL)

294. My child is in a special class in school (for slow learners). (T) (DVL, ACH)

311. My child's favorite stories are fairy tales or nursery rhymes. (T) (ACH)

316. My child learned to count things by age six years. (F) (DVL)

319. My child could print his (her) first name by age six years. (F) (DVL)

328. My child seldom talks. (F)

360. My child is dependent on others. (T)

366. My child first talked before he (she) was two years old. (F) (DVL)

386. My child seems fearful of blood. (F)

388. My child seems more clumsy than other children his (her)
401. I have often found my child playing in the toilet. (F)
428. My child is very popular with other children. (T)
429. My child gets confused easily. (T)
452. My child can count change when buying something. (F)  
      (ACH, DVL)
462. My child can tell the time fairly well. (F)  (DVL)
474. The child's father frequently "blows up" at the child.  
      (F)
490. My child most always tells me where he (she) is going  
      to play. (T)
538. My child daydreams quite a lot. (F)

The Development Scale (DVL)

2. My child seems average or above average in intelligence.  
   (F)  (IS)
58. My child has no special talents. (T)
63. My child could do better in school if he (she) tried.  
   (T)  (ACH, IS)
64. My child can comb his (her) own hair. (F)
73. Now and then my child writes letters to friends. (F)  
      (ACH)
113. I can't get my child to do his (her) school lessons. (T) (ACH)

121. Others think my child is talented. (F) (ACH)

155. My child can cut things with scissors as well as can others of his (her) age. (F) (IS)

254. School has been easy for my child. (F) (ACH)

267. Reading has been a problem for my child. (T) (ACH)

288. My child has never failed a grade in school. (F) (IS)

294. My child is in a special class in school (for slow learners). (T) (ACH, IS)

303. My child loves to work with numbers. (F)

316. My child learned to count things by age six years. (F) (IS)

319. My child could print his (her) first name by age six years. (F) (IS)

366. My child first talked before he (she) was two years old. (F) (IS)

343. Reading is my child's favorite pastime. (F) (ACH)

387. My child is not as strong as most children. (T)

388. My child seems more clumsy than other children his (her) age. (T) (IS)

394. My child seems to understand everything that is said. (F) (ACH)
452. My child can count change when buying something. (F) (ACH, IS)

457. My child shows unusual talent. (F) (ACH)

462. My child can tell the time fairly well. (F) (IS)

533. My child could eat with a fork before age four years. (F) (ACH)

595. Others have remarked how smart my child is. (F) (ACH)

Scale IV: Cognitive Development

2. My child seems average or above average in intelligence. (F) (IS, DVL)

54. My child sometimes undresses outside. (T)

64. My child can comb his (her) own hair. (F) (DVL)

73. Now and then my child writes letters to friends. (F) (ACH, DVL)

97. My child could ride a tricycle by age five years. (F)

121. Others think my child is talented. (F) (ACH, DVL)

149. At one time my child had speech difficulties. (T) (IS)

155. My child can cut things with scissors as well as can others of his (her) age. (F) (IS, DVL)

167. My child has difficulty doing things with his (her) hands. (T) (IS)
186. My child can be left home alone without danger. (F) (IS)

267. Reading has been a special problem for my child. (T) (ACH, DVL)

294. My child is in a special class in school (for slow learners). (T) (ACH, IS, DVL)

316. My child learned to count things by age six years. (F) (IS, DVL)

319. My child could print his (her) own name by age six years. (F) (IS, DVL)

366. My child first talked before he (she) was two years old. (F) (IS, DVL)

388. My child seems more clumsy than other children his (her) age. (T) (IS, DVL)

418. My child gets lost easily. (T)

429. My child gets confused easily. (T) (IS)

448. My child was difficult to toilet train. (T)

452. My child can count change when buying something. (F) (ACH, IS, DVL)

462. My child can tell the time fairly well. (F) (IS, DVL)

471. My child can take a bath by him(her)self. (F)
533. My child could eat with a fork before age four years. (F) (ACH, DVL)

536. My child needs protection from everyday dangers. (T)

595. Others have remarked how smart my child is. (F) (ACH, DVL)

a Indicates direction of scoring
b Indicates overlap with other intellectual scales
### APPENDIX E

#### RAW DATA

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*a Age in months
*b Normative Group
*c Clinical Group
REFERENCES


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VITA AUCTORIS

Joan E. Durrant was born on May 29, 1957 in Windsor, Ontario. In June, 1975 she graduated from Walkerville Secondary School in Windsor. In September, 1975 she enrolled at the University of Windsor. She graduated with the Honours Bachelor of Arts degree in Psychology in May, 1979. Since September, 1979 she has been enrolled in the Doctoral programme in Child-Clinical Psychology at the University of Windsor.