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Comparison of the psychosocial typology of children with below-average IQ to that of children with LD.

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COMPARISON OF THE PSYCHOSOCIAL TYPOLOGY OF CHILDREN WITH

BELOW AVERAGE IQ TO THAT OF CHILDREN WITH LD

By

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ABSTRACT

This study investigates the patterns of psychosocial functioning of children with learning problems who meet other commonly used criteria to define Learning Disabilities (LD) but whose Full Scale Intelligence Quotient (FSIQ) scores on the Wechsler Intelligence Scale for Children (WISC) fall below average. These children are referred to as having below average IQ (BAIQ). The psychosocial functioning of children with BAIQ was subtyped by the application of both Q-factor analysis and profile-matching to scores of the Personality Inventory for Children (PIC). The resulting typologies were compared to that of previously derived prototypes of psychosocial functioning of children with LD (Rourke & Fuerst, 1991). The results suggest that the psychosocial dimensions of children with BAIQ are similar to that of children with LD in a general sense. Many of the same subtypes were derived, and the proportions of children displaying normal, mild, and severe levels of psychopathology were not significantly different from that of children with LD. In addition, consistent with previous research involving children with LD, there were no changes in either type or severity of psychopathology with age. However, there were some specific differences between the psychosocial patterns of children with BAIQ and that of children with LD. Children with BAIQ had a greater tendency to display psychopathology with internalizing features such as anxiety and depression and less tendency to display psychopathology with externalizing features such as delinquency. Also, a new subtype emerged from the Q-analysis which had not been previously found in children with LD. This subtype contains aspects of mild forms of both internal and external psychopathology. Although it is necessary to replicate this study on a new sample of children with BAIQ, some tentative inferences were made concerning the psychosocial dimensions of children with BAIQ.

DEDICATION

I dedicate this thesis to my husband, Lee Ralston. Without his constant encouragement and support the completion of this project would not have been possible. And also to Mr. S. who provided a healthy dose of comic relief and diversion.

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CHAPTER ONE: LITERATURE REVIEW

Introduction

Reliable subtypes of psychosocial dimensions have been delineated in children with learning disabilities (LD) using the the Personality Inventory for Children (PIC; Wirt, Lachar, Klinedinst, & Seat, 1977, 1984); [see Rourke and Fuerst (1991) for an extensive review on this topic]. However, children with learning problems who score below average on standardized psychometric tests of intelligence are usually excluded from these studies (e. g., Porter & Rourke, 1985; Speece, McKinney, & Appelbaum, 1985); therefore, previous research results cannot be generalized to include them. The present study examines the psychosocial typology generated from selected PIC scores of children with learning problems who meet other commonly used criteria to define LD (Rourke, 1975) but whose Full Scale Intelligence Quotient (FSIQ) scores on the Wechsler Intelligence Scale for Children (WISC; Wechsler, 1949) fall below average. This typology is then compared to that found previously in children with LD. The distinction between LD, mental retardation, and general low achievement is somewhat arbitrary and obscured with controversy involving the use of IQ scores as a means of classification (Polloway, Patton, Smith, & Buck, 1997; Siegel, 1988,1989; Stanovich, 1991); therefore, in this paper no attempt is made to classify children with below average IQ scores into one of these three groups. The children are referred to simply as having below average IQ (BAIQ).

As no previous research that we are aware of investigated the psychosocial typology of children with BAIQ, specifically, the following review focuses on the literature that contributed to the understanding of the psychosocial typology of children with LD; this information is then related to the expected psychosocial typology of children with BAIQ. The review begins with a few clarifications and definitions of terms followed by an extensive examination of the relationship between psychosocial dimensions and LD including a review of the three hypotheses that have been used to explain this relationship. Special attention is given to the literature that focuses on the heterogeneity of LD. Then the literature that involves children with below average cognitive ability is reviewed. And

finally, expectations are formulated and the rationale for the present study is explained.

Definitions and Clarifications

Psychosocial functioning.

Before proceeding further, it is necessary to define the term "psychosocial" as it is used in the present context. "Psychosocial" functioning refers to a child's "internal" and "external" personality dynamics. Therefore, the term includes (a) those psychological processes that take place within the child, and (b) those interpersonal processes that take place within the child but originate from both the child and his or her social environment (Rourke & Fuerst, 1996). The term "socioemotional" refers to similar processes and is used interchangeably with the term "psychosocial". Some of the studies that are reviewed use the terms "behavioural" and "emotional" problems; these are considered to be included under the rubric of psychosocial functioning.

Learning Disabilities.

As there is no one standard definition for LD, it is necessary to clarify exactly what is meant by this term in the present context. The following definition is a modification of the one recommended by the National Joint Committee on Learning Disabilities (1981):

> Learning disabilities is a generic term that refers to a heterogeneous group of disorders manifested by significant difficulties in the mastery of one or more of the following: listening, speaking, reading, writing, reasoning, or mathematical, and other skills and abilities that are traditionally referred to as "academic". The term *learning disabilities* is also appropriately applied to instances where persons exhibit significant difficulties in mastering social and other adaptive skills and abilities. In some cases, the investigations of learning disabilities have yielded evidence that would be consistent with hypotheses relating central nervous system dysfunction to the disabilities in question. Even though a learning disability may occur concomitantly with other handicapping conditions (e. g., sensory impairment, mental retardation, social and emotional disturbance) or environmental influences (e. g., cultural differences, insufficient or inappropriate instruction, psychogenic factors), it is not the direct result of those conditions or influences. However, it is

possible that emotional disturbances and other adaptive deficiencies may arise from the same patterns of central processing assets and deficits that generate the manifestations of academic and social learning disabilities. Learning disabilities may arise from genetic variations, biochemical factors, events in the pre- to perinatal period, or any other subsequent events resulting in neurological impairment. (Rourke, 1989, p. 215)

Although the above definition of LD does not include any specific FSIQ score cutoff level, many researchers and clinicians use a cutoff level of 80 or 85 to rule out mental retardation (e. g., Rourke, 1975; Porter & Rourke, 1985; Speece, McKinney, & Appelbaum, 1985). Other common exclusionary criteria include an upper limit of a FSIQ of 115 and a score of at or below the 25 th centile on at least one subtest (Reading, Spelling, or Arithmetic) of the Wide Range Achievement Test (WRAT; Jastak & Jastak, 1965). In keeping with the above definition, hearing and vision problems, sociocultural or economic deprivation, and primary emotional disturbance are also ruled out (Rourke, 1975; Porter & Rourke, 1985). The participants in the present study are a group of children who meet all of the above criteria except that their WISC FSIQ falls between 60 and 85.

The Relationship Between Learning Disabilities and Psychosocial Functioning

Much of the research pertaining to the relationship between psychosocial functioning and LD is permeated with confusion and contradiction. However, most researchers agree that the emotional and interpersonal environments that children with LD must contend with is different from that of normally achieving children (Rourke & Fisk, 1981). Children with LD have been described as having reduced self-concept or self-esteem (Black, 1974; Zimmerman & Allebrand, 1965), being rejected or ignored by peers, teachers, and parents (Bryan, 1974,1976; Dorval, McKinney, & Feagans, 1982; Vaughn, Elbaum, & Schumm, 1996), having aberrant patterns of attributions and locus of control (Sobol, Earn, Bennett, & Humphries, 1983; Wehmeyer & Palmer, 1997), lacking in social competence (Carlson, 1987; Cowen, Pederson, Babigian, Izzo, & Trost, 1973; Sabornie, 1994), and living in families that are similar to those of children who are

emotionally disturbed (Rourke & Fisk, 1981).

Rourke (1988) discussed three hypotheses that have been used to explain the relationship between psychosocial difficulties and LD: (1) psychosocial difficulties cause LD; (2) LD causes psychosocial difficulties; and (3) specific patterns of central processing assets and deficits cause specific subtypes of LD and specific subtypes of psychosocial difficulties. The following includes a brief discussion of each hypothesis in turn.

Hypothesis One: Psychosocial Difficulties Cause LD

According to this view, problems in learning are the direct result of emotional conflicts. Rourke (1988) maintained that support for this hypothesis comes mainly from the clinical observations of professionals who work with children who have LD. These professionals have noted that many children with LD have psychosocial problems such as: difficulties getting along with peers and teachers, extreme emotional disturbances, lack of motivation, stress from exaggerated perceived demands of parents and teachers, and differences between the social expectancies of the student and the social expectancies of the school. All of these problems can interfere with the academic progress of the student. It is assumed that the psychosocial conflict came before the learning problem and once the psychosocial conflict is resolved, the learning problem will also be resolved. However, because individuals with primary emotional problems are usually excluded from LD classifications, these kinds of learning difficulties are usually not considered to be associated with LD. Therefore, the above factors are important for understanding children's learning problems but not for determining the relationship between LD and psychosocial problems (Rourke, 1988; Rourke & Fuerst, 1991). Hypotheses two and three are more relevant to the present context.

Hypothesis Two: LD Causes Psychosocial Difficulties

In contrast to the first hypothesis, the focus of interest of hypothesis two is on LD, as it is usually defined (Rourke, 1975). This hypothesis also suggests causation but in the reverse direction, i. e. that LD leads to psychosocial disturbances. According to Rourke (1988), this view is appealing to many clinicians because it makes intuitive sense that children with LD are more likely to be criticised and negatively evaluated throughout their

academic career by parents, teachers, and peers. This criticism could result in the child becoming progressively more anxious and self-conscious in learning situations which in turn could lead to progressively more problems in learning, causing a vicious circle. A copious amount of research has been conducted in relation to hypothesis two or some variation of it.

Rourke and Fuerst (1991) conducted an extensive review of the literature pertaining to hypothesis two that examined various aspects of socioemotional functioning such as: psychopathology, self-concept or self-esteem, attributions and locus of control, and social status of children with LD. They arrived at the conclusion that this research has not significantly contributed to the understanding of the problems of these children. The results of many studies are immaterial, contradictory to each other, and nonreplicable. No single meaningful pattern of socioemotional functioning of children with LD emanates from the literature, possibly because no such pattern exists (Rourke & Fuerst, 1991).

Rourke and Fuerst (1991) pointed out some of the methodological problems of the aforementioned research. First, the criteria for the selection of subjects with LD were not consistent among studies. Therefore, the subjects in the various studies may not have had exactly the same disability, and this may account for some of the contradictory results. Second, the constructs of psychosocial functioning (i. e., emotional disturbance, behaviour disorder, socioemotional adjustment) were poorly operationalized and subjectively interpreted. Rourke and Fuerst suggested that it would be better to use reliable and valid psychometric instruments to measure psychosocial functioning. Third, most of these studies did not take development into account. Given the idea that LD and socioemotional problems may be related in a circular manner, it is reasonable to assume that socioemotional functioning may vary with age. Therefore, some of the inconsistencies among studies may be explained by the different studies using different ages of subjects. And last, but possibly of greatest importance, most of the studies ignored heterogeneity, using undifferentiated groups of children with LD and comparing them to undifferentiated groups of normally achieving children. The problem with this approach is that it hides with-in group differences and is only appropriate if one can

assume that all children with LD are homogeneous with respect to psychosocial functioning and that all normally achieving children are also homogeneous in this respect (Porter & Rourke, 1985). Children with LD have been found to be heterogeneous in terms of their pattern of academic abilities (e. g., Rourke & Finlayson, 1978; Rourke & Strang, 1978; Strang & Rourke, 1983) and in terms of their patterns of psychosocial functioning (e.g., Porter & Rourke, 1985; Rourke & Fuerst, 1991). The following is a review of the research that made a more significant contribution to the understanding of the psychosocial problems of children with LD by taking heterogeneity and some of the other methodological issues into account.

Review of Research Pertaining to Psychosocial Heterogeneity (Subtypes) of LD

Some of the first studies that investigated the heterogeneity of psychosocial functioning of children with LD utilized principal-components factor analysis as a subtyping technique. According to Rourke and Fuerst (1991), this is a less direct method of grouping subjects than is Q-type factor analysis or cluster analysis which are true statistical subtyping methods. However, the results of these early studies provide some insight to the heterogeneity of psychosocial functioning of children with LD (Rourke & Fuerst, 1991).

Epstein, Cullinan, and Rosemier (1983) examined the psychosocial heterogeneity of 559 male elementary school students with school identified LD and 218 of their normally achieving male peers. Principal-components factor analysis with varimax rotation was applied, separately for each group, to Behavior Problem Checklist (BPC; Quay & Peterson, 1975) scores. The BPC is a standardized instrument on which the child's parent or teacher rates the behaviour patterns of the child. The results recovered four major factors in each group. The factor structure of the group with LD was similar to that of the normally achieving group. The factors were labeled: Attention Deficit (hyperactive), Anxiety, Conduct Problem, and Social Incompetence. The researchers concluded that children with LD as well as normally achieving children appear to be heterogeneous with respect to psychosocial functioning.

Epstein, Bursuck, and Cullinan (1985) divided children with school identified LD

into three groups: 316 older (12 to 18 years) males, 77 older females, and 225 younger (6 to 11 years) females. Principal-components factor analysis was applied separately to each group's BPC scores and revealed similar factors as were found in the study by Epstein et al. (1983) except that some interesting age and gender differences emerged. The Attention Deficit factor did not arise in the older male group. Attention items were incorporated in the Conduct Problem dimension. Although the Attention Deficit factor did emerge for both younger and older females, the content of the factor differed. In older girls the factor contained some conduct items such as *temper tantrums* and *disruptiveness*. No such items were found on this factor for younger girls. The Attention Deficit factor for younger girls contained items that were similar to that of younger boys in the Epstein et al. (1983) study. Epstein et al., (1985) noted that the largest factor in all three groups was the Conduct Problem factor.

A more direct subtyping method was used by Speece et al. (1985). They utilized hierarchical cluster analysis to classify 63 children with school-identified LD and 66 normally achieving children into subtypes of psychosocial functioning based on teacher ratings on the Classroom Behavior Inventory (CBI, Schaefer, Edgerton, & Aronsosn, 1977, cited in Speece et al., 1985). Theoretically, this inventory reflects behaviour such as academic competence, socialization, and temperament. The cluster analysis revealed seven subtypes which were significantly different from one another and were replicated by a split sample internal validation method. A third of the children with LD showed no maladaptive pattern of behaviour. The rest were clustered into distinct subtypes that reflected different degrees of attentional problems, conduct problems, and personal adjustment problems. With respect to the average achievers, 85 percent showed no maladaptive behaviour and 15 percent showed patterns of deviant behaviour that were similar to those of the children with LD. The researchers concluded that children with LD have a tendency to exhibit more psychosocial problems than do normally achieving children; however, there is no one pattern of psychosocial functioning that describes all children with LD. In agreement with the results of previous research (Epstein et al., 1983; Epstein et al., 1985), children with LD appear to be heterogeneous with regards to

psychosocial functioning.

McKinney and Speece (1986) also conducted a three-year longitudinal follow up study of these children. They found that children with attention problems and those with conduct problems exhibited more academic problems in later grades than did the other subtypes. Children with LD tended to switch subtype membership, but the proportion of children in adaptive and maladaptive subtypes were similar to that of earlier grades. Children were more likely to move from one maladaptive subtype to another than from maladaptive to adaptive. McKinney and Speece suggested that the switch from one subtype to another may be related to development.

In sum, the results of the subtyping studies of socioemotional functioning of children with LD contradict the notion that all children with LD have the same pattern of socioemotional functioning and that LD necessarily results in socioemotional disturbance. Some of these children have psychosocial problems but many others do not. According to Rourke and Fuerst (1991), the McKinney and Speece studies make a good contribution to the understanding of the heterogeneity of psychosocial functioning of children with LD except that their criteria for LD is somewhat vague and the regrouping of behavioural subtypes in the longitudinal part of the studies is somewhat questionable. The following section describes some studies that employed a more systematic approach towards the elucidation of psychosocial typology of children with LD.

Windsor taxonomic research.

A series of studies was conducted at the University of Windsor by Rourke and his colleagues (e. g., Porter & Rourke, 1985; Fuerst, Fisk, & Rourke, 1989; Fuerst, Fisk, & Rourke, 1990) that investigated the heterogeneity of children with LD in terms of psychosocial functioning. This series of studies is different from previous studies of this type in that many of the methodological problems mentioned previously were systematically addressed. For example, rigorous criteria were used to select subjects, a standardized psychometric measure of psychosocial functioning was used to examine the subjects' psychosocial profiles, and more direct and advanced statistical methods were used to generate the typology.

The first in the series of studies was carried out by Porter and Rourke (1985). They selected 100 subjects (87 males and 13 females) from a population of children who were referred for neuropsychological testing because of suspected learning problems. The age range of the subjects was from 6.5 years to 15.3 years. All subjects scored between 85 and 115 on the WISC FSIQ and scored at or below the 25 th centile on at least one subtest (Reading, Spelling, or Arithmetic) of the WRAT. Hearing and vision problems, sociocultural or economic deprivation, and primary emotional disturbance were ruled out. In addition, each subject spoke English as his or her primary language and attended school regularly from age 6. The PIC was used to examine the subjects' psychosocial profiles.

The PIC is composed of 600 true-false questions about the child's behaviour, attitudes, and interpersonal relations and is usually administered to the child's parents in an unsupervised setting. There are three validity or response style scales [Lie (L), Frequency (F), and Defensiveness (DEF)], one general screening scale [Adjustment (ADJ)], and 12 clinical scales [Achievement (ACH), Intellectual Screening (IS), Development (DVL), Somatic Concern (SOM), Depression (D), Family Relations (FAM), Delinquency (DLQ), Withdrawal (WDL), Anxiety (ANX), Psychosis (PSY), Hyperactivity (HPR), and Social Skills (SSK)]. A child's profile is expressed in T-scores with higher scores suggesting greater likelihood of psychological disturbances.

The first step in the study (Porter & Rourke, 1985) was to assess the sample as a whole for socioemotional difficulties by calculating the average PIC scores of the group. Results showed that only the scales that reflect development, intellectual functioning, and academic achievement suggested any difficulties. Scales that are suggestive of socioemotional disturbance were found to be within the normal range. If the study had ended here and the sample as a whole had been used as one group and compared to a normally achieving group, the results would have shown that children with LD are not prone to psychosocial difficulties any more than are normally achieving children. However, the next step in the study suggested a different conclusion. Q-type factor analysis was applied to the PIC scores. The results indicated that 77 of the 100 subjects could be classified into four distinct subtypes which differed significantly from one

another with regards to mean PIC profiles. All four subtypes exhibited varying elevations on developmental, intellectual screening, and academic achievement scales. The largest of the four subtypes included 44 percent of the classified subjects. This group showed no elevations on scales reflecting socioemotional functioning, indicating no significant socioemotional problems. The second subtype included 26% of those classified. The PIC profiles of these children suggested seriously disturbed internalized socioemotional functioning (i. e. depression, withdrawal, and anxiety). Thirteen percent of classified subjects were included in the third subtype which showed elevations on the scale that reflects somatic concern. The fourth subtype included 17 percent of the classified subjects and indicated difficulties related to delinquency, hyperactivity, and family relations. These kinds of problems are often thought of as externalized socioemotional problems. The subtypes found in this study were similar, both in proportion of children in each subtype and in patterns functioning, to the normal and deviant subtypes found by Speece et al. (1985). Porter and Rourke found no differences between subtypes in relation to age, sex, and academic ability; however, the researchers pointed out that the number of subjects was not large enough to make definite conclusions about these issues. In agreement with other studies of this kind (e. g., Epstein et al.,1983; Epstein et al., 1985; Speece et al., 1985), Porter and Rourke concluded that children with LD are heterogeneous with regards to psychosocial functioning; there is no one pattern that is characteristic of all children with LD.

Although Porter and Rourke's (1985) results were impressive, they had neglected to assess the internal validity (reliability) of their factor analytic solution. As factor analysis always produces groupings even on random data, assessing the internal validity (reliability) of the solution is an important step (Fletcher, 1985). Fuerst et al. (1989) set about to rectify this situation. Using the same criteria for LD as did Porter and Rourke, a new and larger sample of children were selected as participants. This sample consisted of 132 six- to twelve-year-old children with LD. Fuerst and his colleagues applied Q-factor analysis to standard PIC scores to determine if the same subtypes that were found by Porter and Rourke would again be recovered. In addition, to ascertain whether various

statistical techniques would produce consistent groupings of children with regard to mean PIC profiles, the researchers subjected the data to five different cluster-analytic techniques and compared these results to the Q-factor analytic results. The Q-factor analysis extracted four factors which accounted for 80 percent of the variance. Seventy-five percent of the total sample was assigned to one of the first three groups. The fourth group included only 3.8 percent and was dropped from subsequent analyses. The mean PIC scores of the three remaining groups compared quite favourably to three similar subtypes found by Porter and Rourke (1985). With respect to the results of the present study, the largest group showed adequate socioemotional functioning with academic difficulties being the major concern. The second largest group exhibited a profile that suggested significant internalized socioemotional difficulties, and the third group suggested significant externalized socioemotional difficulties. The results of the cluster-analytic replications also revealed three-group solutions. Although the cluster techniques included some misclassified subjects (i. e., subjects from the Q-factor analytic derived subtypes that were not classified together by the clustering techniques), all cluster-analysis-derived subtypes correlated .93 or better with the corresponding Q-factor analysis derived subtypes. The researchers arrived at the conclusion that children with LD are heterogeneous in psychosocial functioning and that subtypes with similar patterns of functioning can be reliably found across samples and across various statistical grouping techniques.

The third study in the series that examined psychosocial subtypes of children with LD was conducted by Fuerst and his colleagues (1990). These researchers noted that although the three general patterns of psychosocial functioning of children with LD that were previously elucidated were comparable with the patterns of PIC profiles seen in clinical practice, experience suggested that there is a greater diversity of functioning in this population. A more sophisticated clustering method and a wider range of PIC scales were used in an effort to reveal this diversity. The subjects that were used in this study were the same children with LD that were used in the study by Fuerst et al. (1989). Six clusters (subtypes) rather than three were recovered by the present analysis. These subtypes were given the descriptive labels of Normal (n=34), Mild Anxiety (n=21), Mild hyperactive

(n=34), Somatic Concern (n=17), Internalized Psychopathology (n=26), and Externalized Psychopathology (n=16). The descriptive labels of the subtypes describe the most salient features of the PIC profiles and does not necessarily characterize the behaviour of children in that subtype. The first four groups were indicative of normal and mildly disturbed psychosocial functioning; whereas, the last two groups suggested severe psychosocial disturbance. The normal group exhibited problems only with regards to academic difficulties and was strongly related to the normal group recovered by Fuerst et al. (1989) and by Porter and Rourke (1985). The Somatic Concern group was not related to any group in the Fuerst et al. (1989) study but was related to the Somatic Concern group in the Porter and Rourke study. The Mild Anxiety and Internalized groups were related to the Internalized group of the two previous studies, and the Mild hyperactive group and Externalized group were related to the Externalized group of the previous studies. The researchers (Fuerst et al., 1990) assessed the internal validity (reliability) of their results using 3 additional clustering methods. In agreement with the results of the first method, these methods recovered six subtypes which compared favourably with the six previously recovered subtypes.

Using an even larger sample of 500 cases selected from a database of 5000 children referred for neuropsychological assessment for suspected LD, Fuerst and Rourke (1993) conducted another study that examined psychosocial functioning. Again, PIC scales were subjected to cluster analysis which subsequently recovered six subtypes. Five of the six subtypes were similar to the subtypes that were reported by Fuerst et al. (1990). The Mild Hyperactive subtype of the Fuerst et al. (1990) study was not replicated; however, a new subtype was found. This new subtype was labelled Conduct Disorder.

In the next study in the series of investigations of psychosocial typology of children with LD, Fuerst and Rourke (1995) examined the relationship between age and patterns of psychosocial functioning. It is a commonly held conception that LD may be at least partially responsible for the development of psychosocial disturbances. As mentioned previously, this view is appealing to many clinicians because it makes intuitive sense that children who have LD are more likely to be criticised and negatively evaluated

throughout their academic career by parents, teachers, and peers. This criticism could result in the child with LD becoming progressively more anxious and self-conscious in learning environments (Rourke, 1988). The result of this situation would be an increase in psychopathology with increasing age.

Fuerst and Rourke (1995) divided 728 children with LD into three groups: young (7 to 8 year olds), middle (9 to 10 year olds), and old (11 to 13 year olds). PIC scores were subjected to an initial k-means cluster analysis followed by five additional analyses to asses reliability. The subtypes that were recovered were compared at each age level and were compared to those found previously (Porter & Rourke, 1985; Fuerst et al., 1989, 1990; Fuerst & Rourke, 1993). To simplify subtype comparisons across studies, corresponding subtypes were matched using correlation coefficients, resulting in seven distinct subtypes (i. e., Normal, Mild Hyperactive, Mild Anxiety, Somatic Concern, Conduct Disorder, Internalized Psychopathology, and Externalized Psychopathology). PIC scores of corresponding subtypes across studies were averaged to generate a "prototypical" mean PIC profile. Correlations between each subject's PIC profile in the present study and the seven prototypical PIC profiles were calculated. The subtype to which subjects were assigned to was the one that their PIC profile correlated with most strongly and positively. The results showed that the subtypes that were recovered in this study were comparable to those found in previous research and were comparable at each age level in both shape and in elevation. In addition, the proportion of young, middle, and old subjects in each subtype were similar, indicating that patterns of psychosocial functioning are stable at least across the ages of 7 to 13. In contrast to the commonly held idea that psychosocial problems increase with age in children with LD, the results of this study indicate that psychopathology does not necessarily increase with age.

Tsatsanis, Fuerst, and Rourke (1997) investigated the external validation of the seven prototypical subtypes that were identified and described in the study by Fuerst and Rourke (1995). In order to establish external validation of the subtypes it was necessary to examine whether subtypes differ predictably and meaningfully on a measure different from the one that was used to generate the typology (i. e., PIC profile patterns). A

modified version of the BPC was used for this purpose. The participants were 152 children who were referred for neuropsychological testing for suspected LD. The criteria used to select participants were similar to that used by other studies in this series (e. g., Fuerst et al., 1989, 1990; Porter & Rourke, 1985). The measures that were used to reflect psychosocial functioning were the PIC and the BPC. PIC scores were analyzed in a profile matching program that was developed by Fuerst and Rourke (1995). This program assigned children to the subtype (prototype) that their PIC profile correlated with positively and most strongly. If there were no positive correlations or only insignificant ones (<.40) then the subject was dropped from subsequent analyses. Of the sample, 147 children were assigned to one of the seven subtypes (i. e., Normal, Mild Hyperactive, Mild Anxiety, Somatic Concern, Conduct Disorder, Internalized Psychopathology, and Externalized Psychopathology). Proportions that were assigned to each subtype were similar to that of previous studies. Principal component factor analysis with orthogonal rotation was performed on 46 items of the BPC. Three factors were recovered and labelled as: 1. Externalizing Behaviours, 2. Hyperactive Behavior, and 3. Internalizing Behavior. Factor scores for each child were calculated and the relationship between factor scores and prototypical subtype membership was examined. Overall, it was found that the subtypes could be distinguished by differential scores on the three factors of the BPC. The researchers concluded that prototypical subtypes could be predictably discriminated and identified on a measure other than that which the typology was generated. In addition, age differences among subtypes were examined and in agreement with the results by Fuerst and Rourke (1995), no age differences among subtypes were found indicating that psychosocial functioning remains stable within the age range of 7 to 13 years.

In summary, the series of studies conducted by Rourke and his colleagues contributed greatly to the understanding of the psychosocial problems of children with LD. The distinguishing feature of this line of research is manner in which the researchers addressed many of the methodological problems that have plagued other research of this type. A major limitation of many other studies was the failure to take the heterogeneity of LD into consideration. The results of the studies by Rourke and his colleagues indicated

that there are reliable (replicable) psychosocial subtypes of children with LD. These subtypes were found across samples and across various subtyping statistical techniques. Seven reliable subtypes were identified and described (i. e., Normal, Mild Anxiety, Mild Hyperactive, Somatic Concern, Conduct Disorder, Internalized Psychopathology, and Externalized Psychopathology).

The line of research conducted by Rourke and his colleagues is a good test for hypothesis two. The results of these investigations indicate that LD does not necessarily cause psychosocial problems as more than half of the children with LD exhibited either normal psychosocial functioning or very mild disturbances. However, as a group, children with LD do have a tendency to display somewhat more psychosocial problems than do normally achieving children (Rourke, 2000); therefore, it is possible that some other factor is responsible for both LD and psychosocial difficulties. This factor is discussed in the context of the next hypothesis that was put forth to explain the relationship between LD and psychosocial difficulties.

Hypothesis Three: Specific Patterns of Central Processing Assets and Deficits Cause

Specific Subtypes of LD and Specific Subtypes of Psychosocial Difficulties

Hypothesis three is the second hypothesis that is relevant to the examination of the relationship between LD and socioemotional problems. This hypothesis proposes that different patterns of central processing assets and deficits result in a predisposition for the development of different kinds of LD and different kinds of socioemotional problems (Rourke & Fisk, 1981). Stated another way, socioemotional problems and LD are not directly related in a causal relationship as suggested by hypothesis two but are related in a correlational sense in that both are mainly determined by neurocognitive or neuropsychological strengths and deficits (Rourke & Fuerst, 1991). The following is a review of the literature in support of hypothesis three. First, the relationship between central processing assets and deficits and the distinct ability subtypes of LD is explained and then the relationship between ability subtypes of LD and psychosocial subtypes of LD is examined.

A series of studies by Rourke and his colleagues (Rourke & Finlayson, 1978;

Rourke & Strang, 1978; Strang & Rourke, 1983) indicated that 9 to 14 year-old children with LD who have impaired reading and spelling in the context of better but still impaired mechanical arithmetic skills (Group 2) have very different patterns of neuropsychological assets and deficits than do children with LD who have above average reading and spelling in the context of extremely deficient mechanical arithmetic skills (Group 3). Strang and Rourke (1985a) summarized these differences as follows: Group 3 (later called NLD; Nonverbal Learning Disability) exhibited below normal visual-spatial-organizational abilities, psychomotor performance, tactile-perceptual abilities, and conceptual skills in contrast to normal overlearned, rote verbal abilities. In addition, these children displayed difficulties with both verbal and nonverbal tasks dealing with novelty. Children in group 2 displayed the opposite pattern of assets and deficits, namely, difficulties in almost all language related abilities especially auditory-perceptual abilities in the context of normal visual-spatial-organizational skills, psychomotor abilities, tactile-perceptual abilities, and nonverbal concept-formation.

In the series of studies mentioned above, Rourke and his colleagues demonstrated the heterogeneity of LD in terms of neurocognitive abilities by elucidating distinct LD subtypes. The two groups of children exhibited differential performances on the WRAT reading, spelling, and arithmetic subtests due to their distinct patterns of central processing assets and deficits. As mentioned previously, another series of studies demonstrated the heterogeneity of LD in terms of psychosocial functioning (e. g., Porter & Rourke, 1985; Fuerst et al., 1989; Fuerst, et al., 1990). It was hypothesized that there may be a meaningful relationship between the patterns of central processing assets and deficits that characterize the ability subtypes of LD on one hand and the patterns of psychosocial functioning of children with LD on the other hand (e. g., Ozols & Rourke, 1985; Strang & Rourke, 1985b).

One of the first studies to examine this relationship was conducted by Ozols and Rourke (1985). Two groups of children with LD were classified according to their patterns of neuropsychological assets and deficits. The two groups were: (1) a "language disorder" group (similar to Group 2 children mentioned above) and (2) a "spatial disorder"

group (similar to Group 3). The two groups of children with LD and a control group were tested on four exploratory tasks of social sensitivity. As expected, the results showed that the control group performed better than did both the groups with LD on all four tasks. Also, the spatial disordered group performed better than did the language disordered group on tasks that involved verbal labeling and verbal explanations. Whereas, the children with language disorder performed better than did the children with spatial disorder on tasks that involved understanding social interactions from pictures of various social events and tasks that involved the ability to make inferences about the reasons for feelings that take place in social situations. Ozols and Rourke concluded that although the control group performed better than did both groups with LD, the results suggest that it was not the LD status per se that predicted difficulties, but that the particular difficulties were a function of particular patterns of central processing assets and deficits.

In addition, Ozols and Rourke made qualitative observations of the two groups with LD during the testing. Generally, it was noted that children with language disorder were more alert, interested in the social environment, responsive to the examiner, and variable in emotional responses than were the children with spatial disorder. The children with spatial disorder rarely expressed emotion in their facial expressions, stared blankly at the examiner, and spoke in monotones. Ozols and Rourke observed that the deficiencies that are related to the spatial disorder appeared to be more detrimental to social interactions in actual social situations than were the deficiencies of the language disorder.

Strang and Rourke (1985b) used a different method to examine the relationship between LD ability subtypes and LD psychosocial subtypes. They compared the average PIC profiles of Group 2 and Group 3 children and found that the average profile of the Group 3 children was similar to the Internalized Psychopathology group in the study by Porter and Rourke (1985). This profile is characterized by elevations on the scales of Psychosis, Social Skills, Anxiety, Withdrawal, and Depression. In contrast, the average PIC profile of the Group 2 children resembled the Normal group in the same study. In agreement with Ozols and Rourke (1985), Strang and Rourke concluded that children with Group 3 patterns of central processing assets and deficits have a greater tendency towards

psychosocial difficulties than do children with Group 2 patterns. Namely, children in Group 3 appear to be prone to internalized psychopathology.

In a study that was mentioned previously in reference to the elucidation of psychosocial subtypes of LD, Fuerst et al. (1990) examined the relationship between patterns of cognitive functioning as measured by the WISC and psychosocial functioning as measured by the PIC. Children were classified by patterns of WISC Verbal IQ-Performance IQ (VIQ-PIQ) discrepancies. Results showed that children with VIQ=PIQ and VIQ<PIQ were found mainly in the normal or mildly disturbed psychosocial groups. VIQ>PIQ were found in a lower frequency than expected in the normal and mildly disturbed groups and higher frequency than expected in the severely disturbed groups. As it has been shown that children in Group 2 exhibit VIQ<PIQ pattern of performance on the WISC and Group 3 exhibit VIQ>PIQ pattern of performance (Rourke & Finlayson, 1978), the results of the Fuerst et al. (1990) study can be compared to the results by Strang and Rourke (1985b). In agreement with these previous findings, children with well-developed psycholinguistic skills compared to poorly developed visual-spatial-organizational skills seem to be at greater risk for the development of severe psychopathology than are children with the opposite pattern of skills and those with equally developed skills. In contrast to the results by Strang and Rourke, Fuerst and his colleagues found that the children with VIQ>PIQ were prone to either externalized or internalized psychopathology rather than just internalized. In addition, because the VIQ>PIQ pattern of cognitive skills is one of the symptoms of the syndrome of NLD, these results support the view that children with NLD have a tendency to exhibit significant psychosocial dysfunction (Rourke, 1989).

In another study (Fuerst & Rourke, 1993), the mean WRAT reading, spelling, and arithmetic scores were calculated and examined for differences between psychosocial subtypes of LD. The results indicated that Internalized and Externalized Psychopathology subtypes scored higher on reading and spelling than did Normal, Conduct Disorder, and Somatic Concern subtypes. The Mild Anxiety subtype scored at an intermediate level. It was also noted that the Internalized subtype showed the largest discrepancies between reading versus arithmetic and spelling versus arithmetic (with arithmetic deficient

compared to reading and spelling). These results are consistent with previous results (Fuerst et al., 1990) that indicated that there was a higher percentage of children with better verbal skills than visual-spatial skills in the more severely disturbed groups; therefore, the patterns of cognitive assets and deficits appear to be related not only to type of pathology but also to level of pathology. Similar results were found by Tsatsanis et al. (1997).

Strang and Rourke (1985b) examined some of the reasons why children with deficient nonverbal skills have difficulties in the socioemotional realm. They concluded that most of these children do not do well in novel or unstructured social situations. For example, some of their problems include the fact that they do not attend to or understand nonverbal gestures or communication and their own nonverbal behaviours are not well developed. They also have poor posture, lack of facial or body expression, and a general awkwardness. Group 3 children rely too much on auditory-verbal feedback at the expense of nonverbal feedback. They focus on what is said without taking the context into consideration. They have a tendency to talk too much which often alienates the listeners. The various problems of the group 3 children in social situations may elicit negative feedback from other children. This may result in feelings of confusion and anxiety in the group 3 children because they do not understand why they are being alienated and they do not know what to do about it. Their poor psychomotor abilities have a tendency to further alienate them because they do not perform as well in sports or games as other children do so they are not asked to join in with other children's play very often. Therefore, the older the group 3 child gets, the less experience he or she has in comparison to other children in social interactions, and the further behind in these skills she or he becomes. In addition, group 3 children are often excessively dependent on parents for feedback and direction and often display behaviours of much younger children. Group 2 children usually adapt much better in social situations than do group 3 children and there is evidence that group 2 children are at much less risk of serious psychopathology than are group 3 children in later life (Rourke, Young, & Leenaars, 1989).

In sum, the results of these studies support hypothesis three; namely, that different patterns of central processing assets and deficits can result in a predisposition for the

development of different patterns of academic difficulties and different patterns of socioemotional difficulties. In general, children with no learning difficulties have a tendency to perform better on tasks of social sensitivity and display fewer socioemotional problems than do children with LD. However, it does not appear to be the LD status per se that predicts socioemotional problems but the particular patterns of central processing assets and deficits that predicts both the kind of LD and the kind of socioemotional problems in addition to the level of dysfunction. There is evidence that spatial deficiencies or NLD may be more detrimental to the child's socioemotional functioning than are the deficiencies related to language disorders. In particular, children with NLD are prone to severe psychopathology and the greater the discrepancy between verbal and nonverbal skills (with the deficiency in the nonverbal skills), the more prone the child is to severe internalized psychopathology. The interested reader is referred to Rourke (1989) for a detailed model that accounts for the disposition of the child with NLD to develop a particular pattern of learning problems and a specific kind of severe psychosocial disturbance.

As shown by the results of the above research, patterns of cognitive assets and deficits are related to both the type and level of socioemotional pathology. It is possible that the level of cognitive ability may also be associated with the type and/or level of socioemotional pathology. The following is a review of the research pertaining to below average cognitive ability as measured by psychometric tests of intelligence.

Review of the Research Pertaining to Below Average Cognitive Ability

No previous research that we are aware of examined the psychosocial functioning of children with below average cognitive ability, specifically. However, some researchers included children who were classified as educably mentally retarded (EMR) in their investigations of psychosocial problems in special education students (e. g., Gajar, 1979; Cullinan, Epstein, and Dembinski, 1979); Richmond and Blagg, 1985). Although the FSIQ score of children classified as EMR is a little lower (from 50 to 75) than what is used in the present study for the children with BAIQ (from 60 to 85), these studies can give some insight into the psychosocial dimensions of lower functioning children.

Gajar (1979) used the BPC to compare the behaviour problems of 122 children with emotional disorder (ED), 135 children with LD, and 121 children who were classified as EMR. The criteria that were used to identify the children with LD was unspecified. Three dimensions of the BPC were quantified by summing the ratings, dividing by the number of behaviours listed for each pattern, and multiplying by 100. Higher scores indicated more severe pathology. The results showed that the children with ED scored significantly higher than the other two groups on Conduct Disorder and Personality Problem dimensions, and the children with ED scored significantly higher than the EMR children on the Immaturity-Inadequacy dimension. The ED group was similar to the LD group on the Immaturity-Inadequacy dimension. The BPC was useful in discriminating ED from LD and EMR, but it was not possible to discriminate LD from EMR on the basis of these scores.

Using the same instrument as the above study, Richmond and Blagg (1985) compared behaviour patterns of 120 children, ages 7 to 9 years. There were four groups of 30 children each: EMR, LD, behaviour disordered (BD), and regular class students. Again the the criteria used to classify LD was unspecified. The results were similar to the results of Gajar (1979); no significant differences were found on the three dimensions of the BPC among the EMR, LD, and regular class groups. However, the BD children scored higher on all three dimensions than did each of the other three groups.

Cullinan, Epstein, and Dembinski (1979) used the same four groups as Richmond and Blagg (1985) but utilized a wider age range of subjects: 6 to 18 years. On the Conduct Disorder dimension, the BD group scored higher than all other groups, and the EMR group scored higher than the regular class group; on the Personality Problem dimension, the BD, EMR, and LD groups each exceeded the regular class group; and on the Inadequacy-Immaturity dimension, the EMR group exceeded the regular class group. There was no significant effect for age. The BD group could be discriminated from the other groups on the basis of Conduct Disorder scores. In agreement with the study by Richmond and Blagg (1985), discrimination of LD and EMR groups was not possible on the basis of BPC scores.

Using the same instrument and groups as Cullinan et al. (1979) and Richmond and Blagg (1985), Epstein and Cullinan (1984) investigated the problem behaviours of male adolescent students. The results showed that the BD group scored higher than all other groups on the Conduct Disorder dimension, and the EMR and LD groups exceeded the regular class group on this dimension. On the Personality Problem dimension, the BD group exceeded all other groups, and the EMR and LD groups scored higher than the regular class group. On the Inadequacy-Immaturity dimension, the BD and the EMR groups exceeded the LD and the regular class groups. A fourth dimension of the BPC was used in this study, Socialised Delinquency. On this dimension the BD group scored higher than all other groups. In contrast to the results of the above studies, it was possible to discriminate the LD group from the EMR group on the basis of the Inadequacy-Immaturity dimension.

Cullinan, Schultz, Epstein, and Luebke (1984) conducted another study similar to the one by Epstein and Cullinan (1984) but using only female adolescent students, ages 12 to 16. The results were comparable except that the girls with LD did not score significantly different on the Personality Problem dimension from the group with BD, indicating that adolescent girls with LD have a similar number of problems related to this dimension as do adolescent girls with BD. In agreement with most of the above studies, it was not possible to discriminate the group with LD from the EMR group on any of the BPC dimensions.

Chovan and Morrison (1984) examined the self-concepts of children between nine and 12 years of age. Four groups were defined by psychometrically measured intelligence scores and achievement levels and then classified into traditional categories: (a) educable mentally handicapped, (b) LD, (c) normal achievers, and (d) academically gifted. The children were administered a self-report inventory which had been previously factor analyzed. Six factors were identified: (1) behaviour, (2) intellectual and school status, (3) physical appearance and attributes, (4) anxiety, (5) popularity, and (6) happiness and satisfaction. It was found that there was no difference among the four groups in overall self-concept scores or on five of the factors. However, the normal achievers and the

academically gifted exhibited more positive self-concept on the intellectual and school status factor than did the other two groups.

The results of the above studies suggest that the psychosocial functioning of EMR children may be similar to that of children with LD. However, these studies did not take the heterogeneity of either group into account; therefore, it is difficult to make any definite conclusions. Although the next study did not investigate psychosocial functioning, it does bring some enlightenment to the matter of heterogeneity of low functioning children.

McFadden (1990) examined the effects of FSIQ level on ability subtype structure of "low functioning" children and children with LD. Subjects from ages 9 to 14 years were selected on the basis of the usual LD exclusionary criteria (Rourke, 1975) except that children with below average FSIQ were included. The sample was divided into four groups of 70 based on restricted WISC FSIQ ranges (i. e., 101-110, 91-100, 81-90, and 70-80). The neuropsychological test performance data of each group was cluster analyzed. Reliability and validity of the solution were assessed by conducting the analysis with several different cluster analytic methods. Four subtypes were recovered in each of the four groups for a total of 16 subtypes. There was good agreement among the various cluster analytic methods. Although the levels of performance varied with FSIQ range, comparisons of the subtypes across groups revealed two basic profile shapes (Shape A and Shape B) which occurred within all four groups. Shape A was designated as "language disordered" and was characterized by less developed word definition ability, verbal fluency, and long and short term memory for verbal information in the context of better developed simple and complex motor skills, visual-spatial skills, nonverbal problem solving, and abstract reasoning. Shape B was related to less developed speeded hand-eye coordination and verbal expressive tasks in the context of better developed simple motor and visual-spatial abilities, nonverbal problem solving and abstract reasoning, and vocabulary. This profile was thought to be similar to the "ACID" pattern described in the study by Petrauskas and Rourke (1979); (the "ACID" acronym stands for depressed scores on the WISC subtests: Arithmetic, Coding, Information, and Digit Span). McFadden concluded that eight out of the 16 subtype profiles could be assigned to either

Shape A or Shape B. Two other subtypes were similar to these two basic shapes. The six remaining subtypes were too different from each other and the basic shapes to form any more shape categories. By elucidating the heterogeneity of lower functioning children and by demonstrating the similarities between ability subtypes of these children and those of children with average cognitive functioning, McFadden's results provide information that is conducive to the formulation of expectations for the present study.

<div align="center">Predictions</div>

As no previous studies specifically examined the psychosocial dimensions of children with BAIQ, the present study is considered to be exploratory in nature. Therefore, some of the hypotheses are more general than specific.

1. It is expected that the psychosocial subtype structure that will emerge from the application of statistical subtyping techniques on selected PIC scores of children with BAIQ will be similar to that of children with LD (Fuerst, et al., 1989; Fuerst, et al., 1990; Fuerst & Rourke, 1993) based on the following reasons: (a) Studies that examined the psychosocial functioning of children with EMR did not find any consistent differences between children with EMR and those with LD (e. g., Cullinan, et al., 1984; Richmond & Blagg, 1985), and (b) McFadden (1990) found that groups with lower than average FSIQ scores contained some of the same ability subtypes that were found in groups with average FSIQ scores; and, as it has been shown that there is a relationship between ability subtype patterns and psychosocial subtype patterns (e. g., Fuerst et al., 1990; Fuerst & Rourke, 1993; Tsatsanis et al., 1997), it stands to reason that similar psychosocial subtypes may be found in children with BAIQ as have been previously found in children with LD (e. g., Fuerst, et al., 1989; Fuerst, et al., 1990; Fuerst & Rourke, 1993).

Namely, any or all of the following subtypes are expected to emerge: Normal, Mild Anxiety, Mild hyperactive, Somatic Concern, Internalized Psychopathology, Externalized Psychopathology, and Conduct Disorder. The three most reliable subtypes (i. e., Normal, Internalized Psychopathology, and Externalized Psychopathology) that have been consistently revealed in previous research (e. g., Fuerst, et al., 1989; Fuerst, et al., 1990; Porter & Rourke, 1985) are especially expected to emerge. Consistent with

previous research, the normal group is expected to exhibit elevations only on the PIC scales that reflect developmental, intellectual, and academic achievement difficulties (i. e., ACH, IS, DVL). Scales that are suggestive of socioemotional disturbance are expected to be within the normal range. The other subtypes are expected to show elevations on the ACH, IS, and DVL scales in addition to showing elevations on scales that reflect socioemotional difficulties. The Mild Anxiety and Internalized Psychopathology groups are expected to exhibit elevations on scales that reflect anxiety, depression, and withdrawal (i. e., ANX, D, WDL). The Internalized Psychopathology group represents a more severe form of disorder and will also show elevations on the scale that reflects psychological disturbances (i. e., PSY). The Mild Hyperactive, Externalized Psychopathology, and Conduct Disorder groups will show elevations on the scales that reflect externalized socioemotional problems such as: delinquency, hyperactivity, and family relationship problems (i. e., DLQ, HPR, FAM). The Externalized Psychopathology group represents a more severe form of disorder and will also show elevations on the scale that reflects psychological disturbances. The Somatic Concern group is expected to show elevations on the scale that is suggestive of health problems (i. e., SOM).

2. It is expected that children with BAIQ will be assigned to subtypes in similar proportions as has been found in children with LD (Fuerst & Rourke, 1995; Rourke & Fuerst, 1991) based on the same reasoning as was delineated in relation to the first expectation. Namely, it is expected that half to two-thirds of the children will exhibit either Normal psychosocial functioning or mild disturbances (i. e., Mild Anxiety, Mild hyperactive, Somatic Concern, and/or Conduct Disorder). The rest of the children will be divided approximately equally between the more severely disturbed subtypes (i. e., Internalized and Externalized Psychopathology).

3. It is expected that there will be no changes in psychopathological type or severity with age based on the following reasons: (a) Fuerst and Rourke (1995) compared three age groups of children with LD and found that subtypes were comparable at each age level both in profile shape and elevation, and that the proportion of young, middle, and old subjects in each subtype was also comparable indicating that patterns of psychosocial

functioning of children with LD are stable across the ages of 7 to 13, and (b) Tsatsanis et al. (1997) compared age levels among severity of psychopathology groups and found no differences, also indicating stability of psychosocial functioning.

<div align="center">Rationale</div>

The purpose of the present study is to expand the knowledge of psychosocial typology to include children with BAIQ. This is done by generating psychosocial subtypes from selected PIC scores of children with BAIQ and comparing the resulting subtypes to those that have been previously found in children with LD (e. g., Fuerst, et al., 1989; Fuerst, et al., 1990; Fuerst & Rourke, 1993). Although in the above literature review some attention was given to the relationship between patterns of neurocognitive assets and deficits on one hand and psychosocial subtypes on the other, the examination of this relationship in children with BAIQ is beyond the scope of this paper. Perhaps future research will explore this topic.

The delineation of the psychosocial typology of children with BAIQ is a worthwhile endeavour because there is little knowledge about these children (Zetlin & Murtaugh, 1990) and it has some implications for treatment. For example, if similar subtypes are found as those that have been found in children with LD, then similar psychosocial intervention techniques can be utilized for both groups. However, if different subtypes are found, then new intervention strategies may have to be developed to assist these children.

CHAPTER TWO: METHODS

Subjects

The participants in this study were 101 children (68 males and 33 females) who were selected from a population of 5296 children that were referred for neuropsychological assessment because of learning difficulties. Competent technicians administered an extensive neuropsychological test battery to each child. The selection criteria for the subjects were: (a) chronological age between 7.0 and 14.9 years (inclusive); (b) WISC FSIQ score between 60 and 84; (c) at least one WRAT centile score below 25; (d) no educational or cultural deprivation; (e) no primary emotional problems; and (f) the availability of complete PIC scale scores. Detailed socioeconomic information was not available for selected children; however, the sample was drawn from a homogeneous lower to middle class urban/suburban population. See Table 1 for Subject's age and WISC IQ summary statistics by gender.

Materials

The Personality Inventory for Children (PIC) includes 600 true-false questions about the child's behaviour, attitudes, and interpersonal relations and is usually administered to the child's primary caretaker in an unsupervised setting (Wirt et al., 1977, 1984). Up to 33 scales can be derived from items but usually only 16 scales are used which include: three validity or response style scales [Lie (L), Frequency (F), and Defensiveness (DEF)], one general screening scale [Adjustment (ADJ)], and 12 clinical scales [Achievement (ACH), Intellectual Screening (IS), Development (DVL), Somatic Concern (SOM), Depression (D), Family Relations (FAM), Delinquency (DLQ), Withdrawal (WDL), Anxiety (ANX), Psychosis (PSY), Hyperactivity (HPR), and Social Skills (SSK)]. See the Appendix for a brief description of the clinical scales. A child's profile is expressed in T-scores with higher scores suggesting greater likelihood of psychological disturbances.

Scale construction of the PIC involved both empirical and rational strategies. One study reported alpha coefficients of internal consistency which ranged from .62 to .84 for 13 scales in a normative sample of 2390. Another study reported test-retest product-

moment correlations that ranged from .68 to .97 for all 33 scales (Wirt et al., 1977, 1984).

Table 1

Subject's age, WISC Full Scale (FSIQ), Verbal IQ (VIQ), and Performance IQ (PIQ)
Summary Statistics by Gender

Males (N = 68)

	M	SD	Range
Age	10.1	2.1	7.1-14.8
WISC			
FSIQ	78.4	5.8	62-84
VIQ	77.9	7.0	63-92
PIQ	81.6	9.4	57-98

Females (N = 33)

	M	SD	Range
Age	10.2	2.2	7.2-14.8
WISC			
FSIQ	80.3	5.8	63-84
VIQ	80.3	7.4	63-94
PIQ	80.4	8.3	64-100

Note. WISC = Wechsler Intelligence Scale for Children (Wechsler, 1949), FSIQ = Full

Scale Intelligence Quotient, VIQ = Verbal Intelligence Quotient, and PIQ = Performance

Intelligence Quotient.

CHAPTER THREE: RESULTS

Q-analysis Derived Psychosocial Typology of Children with BAIQ

A Q-type factor analysis (using SAS version 6) was applied to selected PIC scores of the participants to determine the psychosocial typology of children with BAIQ. Q-analysis was chosen as the statistical subtyping technique for this study because it has shown good performance in previous research of this type using a similar number of subjects (e. g. Porter & Rourke, 1985; Fuerst et al., 1989). PIC scales were selected for the analysis based on minimizing the amount of interscale overlap and maximizing the representation of dimensions measured by the PIC (Porter & Rourke, 1985). Subjects' scores on 10 of the clinical scales of the PIC were utilized (DVL, SOM, D, FAM, DLQ, WDL, ANX, PSY, HPR, and SSK). ACH and IS scales were not included because according to Fuerst and Rourke (1995), these two scales are highly correlated with the DVL scale and provide little additional information.

Outlier Detection and Deletion

As factor analysis techniques are extremely sensitive to outliers (Tabachnick & Fidell, 1996), the first step in the analysis was to screen for them. The method used in this study is similar to the one used by Fuerst and Rourke (1995) and involves a three step process. First, in order to eliminate profile elevation and dispersion, each subject's scores on the 10 selected PIC scales were standardized across that subject's profile. Next, the Euclidean distance between each subject's scores on the 10 PIC scales and those of all other subjects were calculated. Each distance was compared to a previously selected constant value (the "radius"). A running frequency count was kept for each subject's distances that were less than or equal to the radius. The frequency count is proportionate to the density of other subjects around a particular subject. Cases relatively similar to other cases are found in higher density regions; whereas, cases that are relatively dissimilar to others are found in low density regions and are considered to be outliers. In this manner, 6 subjects (5.9% of the sample) were deemed outliers and were eliminated from subsequent analyses.

The Q-analysis

Regarding the Q-analysis, a data matrix was constructed containing each remaining subject's PIC scores on the 10 selected scales. This data matrix was transposed and the intercorrelations between subject profiles were calculated. Principal-components solution was used to factor the correlation matrix (Fuerst et al., 1989). Orthogonal rotation to varimax criterion was carried out on factors with eigenvalues equal to or greater than the ratio of the number of subjects to the number of variables (i.e., 9.5) plus one additional factor. The result of this analysis yielded five factors that accounted for 78% of the variance and indicated that the subject sample was comprised of five subtypes that differed from each other with respect to psychosocial functioning as reflected by the selected PIC variables.

Subjects with factor loadings of greater than or equal to positive .50 on at least one factor with an interval of greater than or equal to .10 between their highest and next highest loading were used to define subtypes based on the factor they loaded highest on (Porter & Rourke, 1985; Fuerst et al., 1989). Of the 95 subjects used in the analysis, 71 (75%) met the above criteria; 24 (25%) were excluded. Nine of these excluded subjects displayed no loadings of at least .50 on any factor and 15 did not exhibit an interval of at least .10 between their two highest loadings.

The largest number of subjects (30% of those assigned to subtypes; n=21) were assigned to subtype 1 (i. e., the first factor). Subtypes 3 and 4 each contained 15 (21% each, of those assigned) members and subtypes 2 and 5 each contained 10 (14% each, of those assigned) members. For each Q-analysis derived subtype the mean PIC scale scores for all 16 scales were calculated and used to plot PIC profiles displayed in Figures 1, 2, 4, 6, and 8. (For comparison, the Figures also show the prototypes which are highly correlated with the Q-analysis derived subtypes and the results of the profile-matching algorithm—these concepts and results are explained below.)

Relationship to Known LD Psychosocial Subtypes

Mean PIC Profile Similarities and Differences

Visual inspection of the Figures suggests distinct similarities between the PIC

profiles of the Q-analysis derived psychosocial subtypes of children with BAIQ and the PIC profiles of some of the prototypical subtypes that have been derived through previous research using children with LD (Fuerst & Rourke, 1995; Rourke & Fuerst, 1991). To confirm this impression the means of the previously selected 10 clinical PIC scales of each Q-analysis derived subtype were correlated with corresponding means of the seven prototypical subtypes (i. e., Normal, Mild Anxiety, Mild Hyperactive, Somatic Concern, Internalized Psychopathology, Externalized Psychopathology, and Conduct Disorder). These correlations are an indication of the degree of similarity between the mean PIC profile shapes of the Q-analysis derived subtypes and those of the prototypes. The results of the correlation analysis are displayed in Table 2. As can be seen from the Table, Q-analysis derived subtype 1 is highly correlated with only one prototype, Internalized Psychopathology (r=.93), and represents a good replication of this prototype. Q-analysis derived subtypes 3 and 5 represent good replications of the Normal prototype (r=.94) and the Somatic Concern prototype (r=.93), respectively. Subtype 2 represents an adequate replication of the Mild Hyperactive prototype (r=.83). When the PIC profiles of these two subtypes are compared (see Figure 2), it is apparent that the main difference is that Subtype 2 exhibits an elevation of approximately 15 points higher on the PSY scale than does the Mild Hyperactive prototype. (It should also be noted that all five of the Q-analysis derived subtypes of psychosocial functioning of children with BAIQ evidence much higher elevations on the IS scale than do the prototypical subtypes of children with LD. As the IS scale is a reflection of parental concern that the child's difficulties may be due to impaired intellectual functioning, it makes intuitive sense that children with BAIQ, on average, exhibit higher elevations on this scale than do children with LD.) Q-analysis derived subtype 4 did not correlate highly with any one prototype but showed moderate correlations with three prototypes: Internalized Psychopathology (r=.59), Externalized Psychopathology (r=.59), and Mild Anxiety (r=.56). The PIC profile of subtype 4 is displayed alone in Figure 8. This subtype has not been found in previous research using children with LD. Based on its most salient features, the subtype was named Mild Anxiety/Depression. The Conduct Disorder, Mild Anxiety, and Externalized

Psychopathology prototypes were not adequately replicated in the present sample of children with BAIQ using Q-type factor analysis.

Proportion Similarities and Differences

In addition to the comparison of mean PIC profile shapes to the prototypes, the Q-analysis derived subtypes were also compared to the prototypes in relation to the proportion of assigned subjects falling into each subtype. Table 3 shows that the percentage of cases assigned to the Normal group (subtype 3; 21% of those assigned to subtypes) is very similar to that of the Normal prototype (24% of those assigned); however, the Internalized Psychopathology group (subtype 1) is almost twice as large as the corresponding prototype. The Mild Hyperactive group (subtype 2) is slightly smaller than the corresponding prototype; whereas, the Somatic Concern group (subtype 5) is somewhat larger.

A Chi-Square Test for Goodness of Fit (Aron & Aron, 1994) was used to determine significant differences in proportion. As the subtypical structure that emerged from the Q-analysis is quite different from that of the prototypes, to ease comparison the subtypes were collapsed into three groups for subsequent analyses. This also has the added benefit of increasing the power of the statistical tests. The subtypes were grouped according to degree of severity (i. e., Normal, Mild, and Severe) and according to type of psychopathology (i. e., Normal, Externalized, and Internalized) in a manner similar to that used by Tsatsanis et al. (1997).

The Q-analysis derived Normal group consisted of children assigned to the Normal subtype; the Mild category contained children assigned to the Mild Hyperactive, Somatic Concern, and Mild Anxiety/Depression subtypes; and the Severe group contained children assigned to the Internalized Psychopathology subtype. The number of members in each of these three groups was the observed frequency and the expected frequency was the number of members in the prototype groups: Normal (Normal), Mild (Mild Hyperactive, Mild Anxiety, Somatic Concern, and Conduct Disorder), and Severe (Internalized Psychopathology and Externalized Psychopathology). Using an alpha level of .05 for all statistical tests, the result of the Chi-square test was not significant, Chi-

square (2) = .468, p >.05, suggesting that the proportions of children with BAIQ that exhibited Normal, Mild, and Severe levels of psychopathology was the same as that previously found in children with LD.

Comparisons in type of psychopathology were also made (i. e., Normal, Internal, and External). The Q-analysis derived Normal group consisted of children assigned to the Normal subtype. The External group consisted of children assigned to the Mild Hyperactive subtype and the Internal group was made up of children assigned to the Internalized Psychopathology subtype. Although the most salient features of the Mild Anxiety/Depression subtype reflect aspects of internalized psychopathology (i. e., Anxiety and Depression), it was not used in this analysis because it also exhibits moderate elevations on features of externalized psychopathology (i. e., Delinquency and Hyperactivity); in fact, it is moderately correlated with both Externalized and Internalized Psychopathology prototypes. The prototypical subtypes were divided as follows: the Normal group consisted of subjects assigned to the Normal prototype; the External group was made up of children assigned to the Mild Hyperactive and Externalized Psychopathology prototypes; and the Internal group contained those assigned to Mild Anxiety and Internalized Psychopathology prototypes. In this case, the Chi-square test was significant, Chi-square (2) = 13.102, p < .05, indicating that the proportions of children with BAIQ that exhibited Normal, Internal, and External types of psychopathology was significantly different from that found in children with LD. Children with BAIQ appear to be less likely to exhibit external aspects of psychopathology, especially in its more severe form.

Relationship Between Psychosocial Structure and Age

To determine if there were psychopathological changes with age, the cases that were used to define the Q-analysis derived subtypes (N=71) were divided into three age groups: Young (ages 7.0 to 8.9 years; n=26), Middle (9.0 to 11.9; n=24), and Old (12.0 to 14.9; n=21). Figure 9 displays the percentage of each age group assigned to each of the subtypes. (This means, for example, that of the Middle children, 17% were assigned to the Mild Hyperactive subtype.) To increase power, the subtypes were collapsed into three

groups for subsequent analyses. First, according to degree of psychopathology severity (i. e., Normal, Mild, and Severe) and then, according to type of psychopathology (i. e., Normal, Internal, and External) in the same manner as was described in the above section on proportion. Chi-square Tests for Independence (Aron & Aron, 1994) were conducted. The results of the Chi-square test comparing severity of psychopathology and age was nonsignificant, Chi-square (4) = 1.836, p > .05, as was the test comparing type of psychopathology and age, Chi-square (4) = 1.110, p > .05, indicating that there was no relationship between age and severity or type of psychopathology. In other words, there were no changes in psychopathological severity or type with age, within the age range examined in this study.

Profile-Matching Derived Psychosocial Typology of Children with BAIQ

A second method of deriving subtypes of psychosocial functioning of children with BAIQ entailed a profile-matching algorithm designed by Fuerst (Fuerst & Rourke, 1995; Rourke & Fuerst, 1991) using SAS macro programming language. Scores of the same 10 PIC scales that were used for the Q-analysis (i. e., DVL, SOM, D, FAM, DLQ, WDL, ANX, PSY, HPR, and SSK) of the entire sample of children with BAIQ (N=101) were used in the analysis which involved the calculation of the correlation between each subject's PIC profile and the PIC profiles of the seven previously mentioned prototypes. Subjects were assigned to the subtype to which their PIC profile correlated with most strongly and positively. Those showing only negative or weak correlations (i. e., <.40) with the prototypical profiles and/or an interval of less than .10 between their two highest correlations were considered to be outliers and were dropped from further analyses.

Using the above method, 96% (N=97) of the total sample were assigned to one of the seven subtypes. Four subjects (4% of the total sample) were rejected as outliers. The largest number of subjects, 27 (28% of assigned subjects) were matched to the Internalized Psychopathology prototype. The second largest number of subjects, 20 (21% of those assigned) were matched to the Normal prototype. The next largest number of subjects, 14 (14% of those assigned) were matched to the Somatic Concern prototype. Approximately equal number of subjects, 12, 11, and 10 (12%, 11%, and 10%, respectively) were

matched to the Mild Hyperactive, Mild Anxiety, and Externalized Psychopathology prototypes. The smallest number of subjects, 3 (3% of those assigned) were matched to the Conduct Disorder prototype.

Relationship to Prototypes and Q-analysis Derived Subtypes

Mean PIC Profile Similarities and Differences

The mean PIC profiles for each of the seven profile-matching derived (PMD) subtypes were calculated and are shown in Figures 1 to 7. Visual inspection of the Figures suggests distinct similarities between the PMD subtypes and the corresponding prototypes. To confirm this impression, the means of the previously selected 10 clinical PIC scales of each PMD subtype were correlated with the corresponding means of the prototypical subtypes. The results of the correlation analysis are displayed in Table 4 which shows that all the PMD subtypes are correlated .89 or better with their corresponding prototypes with one exception: the PMD Conduct Disorder subtype is only moderately correlated (r=.55) with its corresponding prototype. Figure 5 shows that, while the two profiles are virtually the same shape, the PMD subtype evidences lower mean scores (approximately 10 points) on the clinical scales than does the prototype. A few other minor differences between the two typologies were noted such as: the PSY scale of the PMD Normal subtype is slightly elevated compared to the corresponding prototype, and the PSY scale of PMD Mild Hyperactive subtype is elevated approximately 15 points compared to the corresponding prototype. In addition, almost all the PMD subtypes of psychosocial functioning of children with BAIQ exhibit substantially higher elevations on the IS scale than do the prototypes.

Figures 1, 2, 4, and 6 show similarities and differences between the PMD subtypes and the corresponding Q-analysis derived subtypes. The PMD Mild Hyperactive subtype and the Q-analysis derived Mild Hyperactive subtype are almost identical in both shape and elevation. Both of these subtypes evidence greater elevations on the PSY scale compared to the prototype. Consistent with comparison between the PMD subtype and the prototype, the PSY scale of the PMD Normal subtype is slightly elevated compared to the Normal Q-analysis derived subtype.

Proportion Similarities and Differences

Percentages of subjects assigned to each PMD subtype are displayed in Table 3. The Table shows that there are some proportion similarities and differences between the PMD subtypes and that of the prototypes. For example, the Normal subtypes of both typologies are similar in size. The PMD and prototype Mild Anxiety subtypes are also similar in size. In agreement with the proportion differences between the prototypes and the Q-analysis derived subtypes, the PMD Mild Hyperactive subtype is smaller than the corresponding prototype; whereas, the Somatic Concern subtype is somewhat larger. Also in agreement with the Q-analysis subtype structure, the PMD Internalized Psychopathology subtype is the largest subtype of the typology and it is much larger than the corresponding prototype. In addition, the PMD Conduct Disorder and Externalized Psychopathology subtypes are both a little smaller than those of the prototypes.

A Chi-square Test for Goodness of Fit (Aron & Aron, 1994) was used to determine if the proportion differences that were noted between the PMD subtypes and the prototypes were significant. Because the subtypical structures of the prototypes and the PMD subtypes are identical, seven groups were used in the analysis. The result was significant, Chi-square (6) = 18.530, $p<.05$, indicating that children with BAIQ were assigned to PMD subtypes in proportions that were significantly different from that of the prototypes.

Table 3 shows that there are some definite similarities between the number of subjects within each PMD subtype and that of the corresponding Q-analysis derived subtype. The PMD Normal, Mild Hyperactive, Somatic Concern, and Internalized Psychopathology groups are all similar in size compared to the corresponding Q-analysis derived subtypes. A Chi-square test was used to determine if there were, in fact, no significant differences between the two typologies in the proportion of members within the various subtypes. Because the subtypical structure that emerged from the Q-analysis is different from that of the profile-matching method, to ease comparison the subtypes were collapsed into three groups in the same manner as was described above in the section on proportion similarities and differences between the Q-analysis subtypes and the

prototypes. Again, the subtypes were grouped according to degree of psychopathology severity (i. e., Normal, Mild, and Severe) and according to type of psychopathology (i. e., Normal, Externalized, and Internalized). The results were nonsignificant in relation to psychopathology severity, Chi-square (2) = 3.783, p > .05, and in relation to type of psychopathology, Chi-square (2) = 2.348, p >.05. These results suggest that the proportions of children with BAIQ assigned to the various PMD subtypes were not significantly different than the proportions of children assigned to the various Q-analysis subtypes in relation to both type and severity of psychopathology.

Relationship Between Psychosocial Structure and Age

To determine if there were psychopathological changes with age, the subjects that were used to define PMD subtypes (N=97) were divided into three age groups: Young (ages 7.0 to 8.9 years; n=39), Middle (9.0 to 11.9; n=36), and Old (12.0 to 14.9; n=22). The power of the statistical tests was increased by collapsing the subtypes into three groups. First, according to severity of psychopathology (i. e., Normal, Mild, and Severe) and then, according to type of psychopathology (i. e., Normal, Internal, and External) in a similar manner as was described above. A Chi-square Test for Independence (Aron & Aron, 1994) comparing severity of psychopathology and age was nonsignificant, Chi-square (4) = 3.269, p >.05, as was the test comparing type of psychopathology and age, Chi-square (4) = 1.306, p >.05. In agreement with the results from the Q-analysis, the PMD results suggest that there was no relationship between age and severity or type of psychopathology. In other words, within the age range examined in this study, there were no changes in psychopathological severity or type with age.

VIQs-PIQs of PMD Subtypes

Previous research that involved children with LD indicated that WISC Verbal IQ - Performance IQ (VIQ-PIQ) discrepancies are related to psychosocial subtype membership (e. g., Fuerst et al., 1990; Rourke & Fuerst, 1991). Namely, that children with VIQ=PIQ and VIQ<PIQ were found mainly in the normal or mildly disturbed subtypes, and children with VIQ>PIQ were found in a higher frequency than expected in the severely disturbed subtypes, especially Internalized Psychopathology. Although the examination of the

relationship between cognitive assets and deficits on one hand and psychosocial subtype

membership on the other is beyond the scope of this paper, the VIQs, PIQs, and FSIQs

for each PMD subtype were calculated (see Table 5) to see if trends similar to those of

children with LD occurred in this sample of children with BAIQ. As can be seen from the

Table, there are trends towards VIQ<PIQ in the normal and mildly disturbed subtypes and

VIQ>PIQ in the Internalized Psychopathology subtype. To see if these trends were

significant, a one way ANOVA with repeated measures was conducted. The results

indicated that there was no significant difference between groups in relation to VIQ, $\underline{F}$

$(1,82) = 1.603$, $\underline{p} < .50$. There was, however, a significant difference between groups in

relation to PIQ. The normal and mildly disturbed group had significantly higher PIQ's

than did the Internalized Psychopathology group.
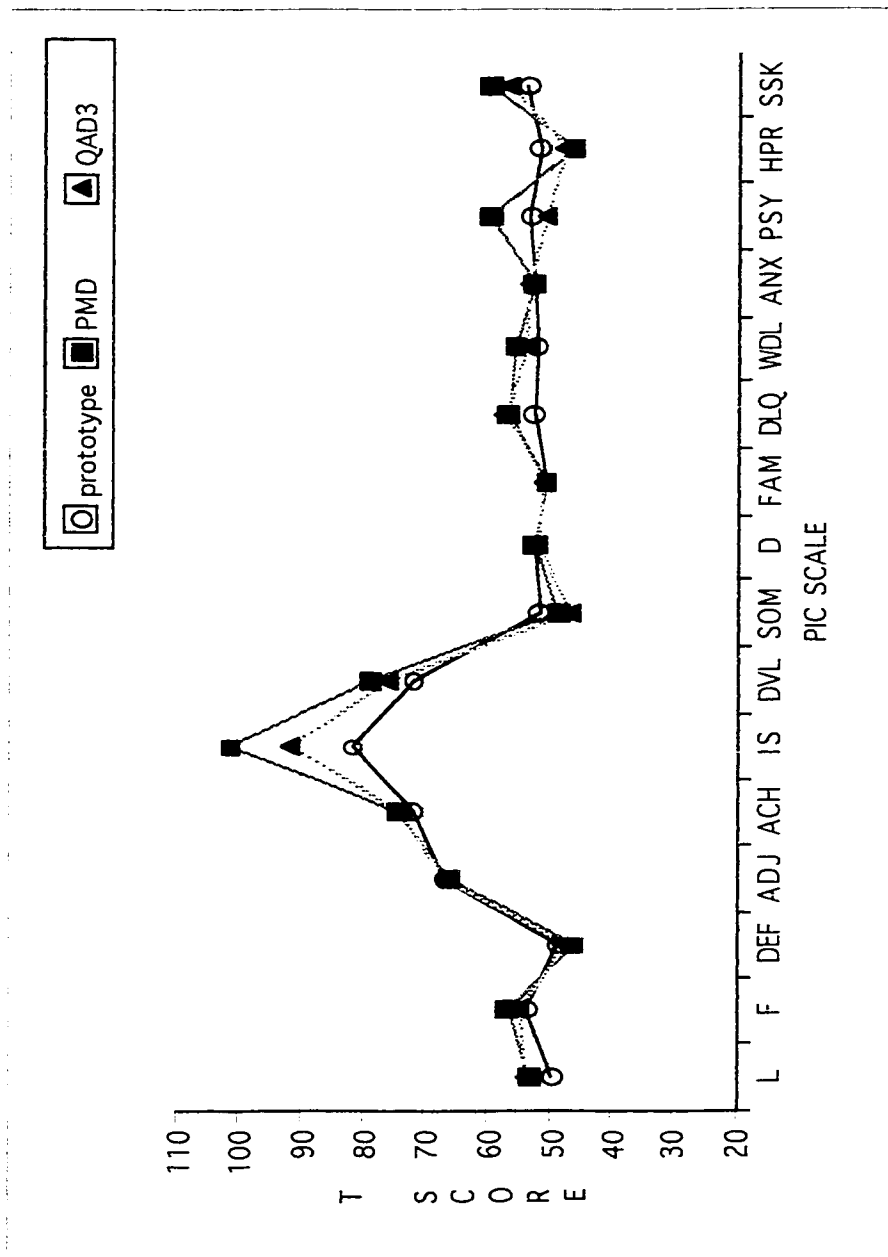
Figure 1. Mean PIC Profile for the Normal Subtype. PIC = Personality Inventory for Children (Wirt et al., 1977); PMD = Profile Matching Derived Subtypes; QAD3 = Q-analysis derived subtype 3. See text for PIC scale abreviations.

Figure 2. Mean PIC Profile for the Mild Hyperactive Subtype. Abbreviations are the same as for Figure 1.
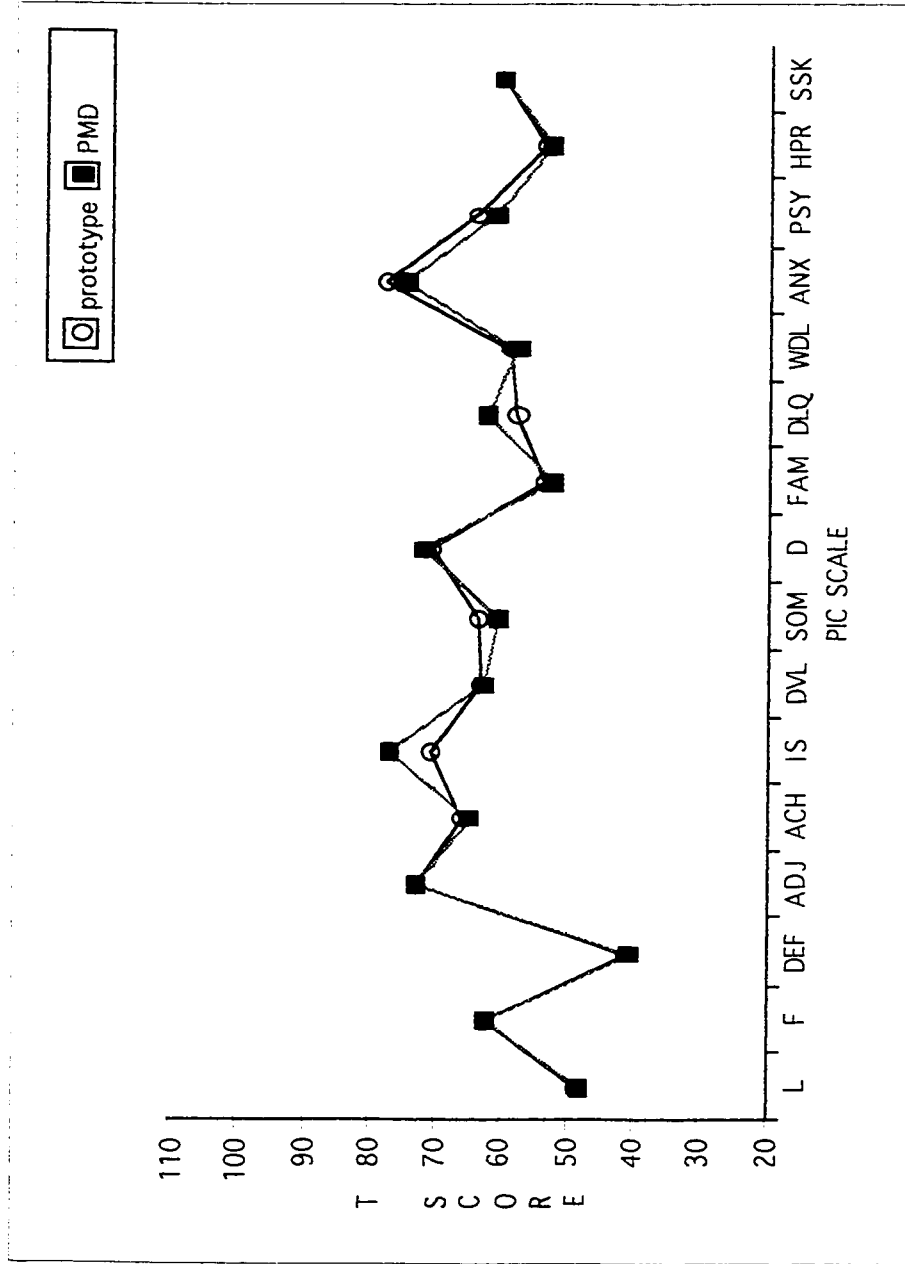
Figure 3. Mean PIC Profile for the Mild Anxiety Subtype. Abreviations are the same as for Figure 1.
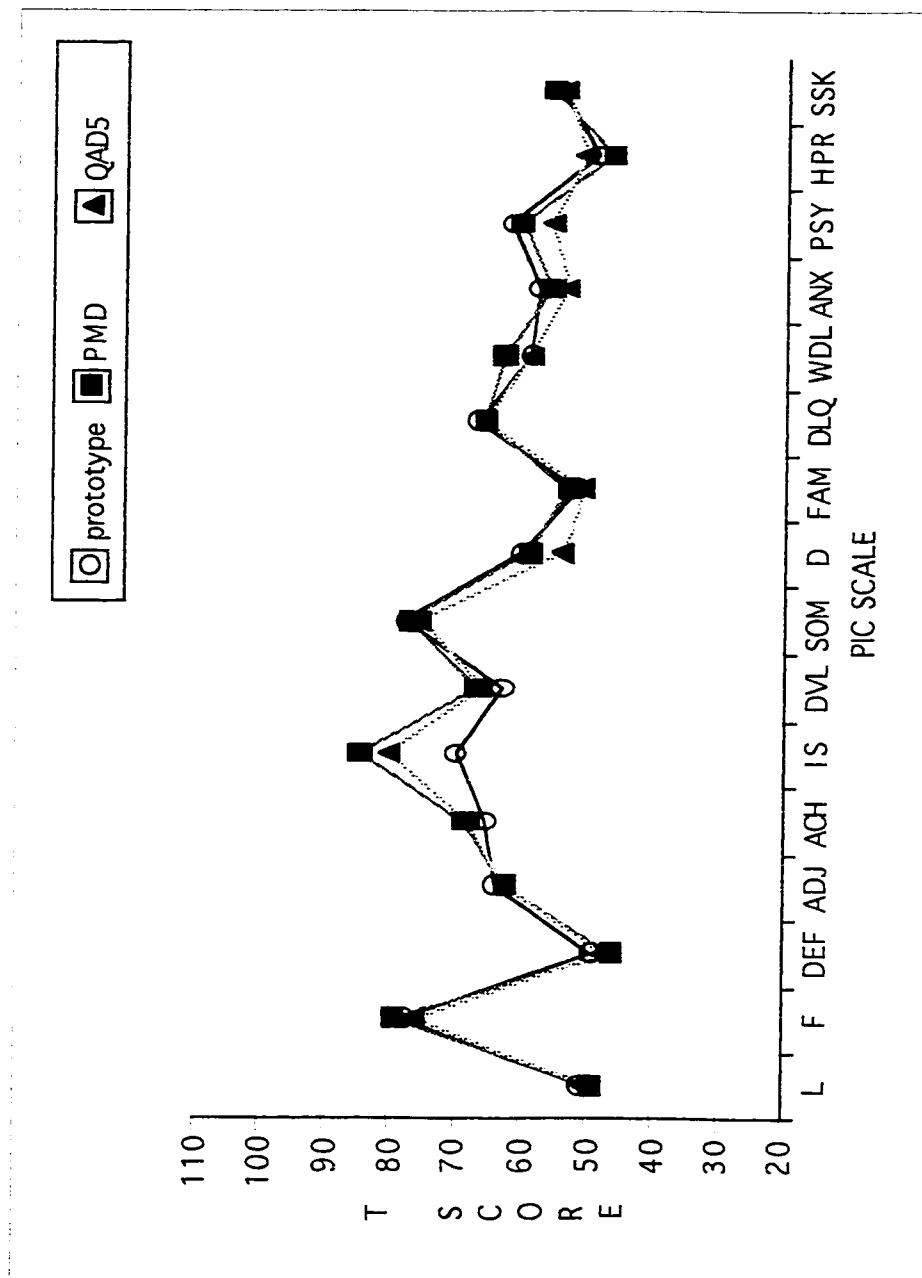
Figure 4. Mean PIC Profile of the Somatic Concern Subtype. Abreviations are the same as for figure 1.

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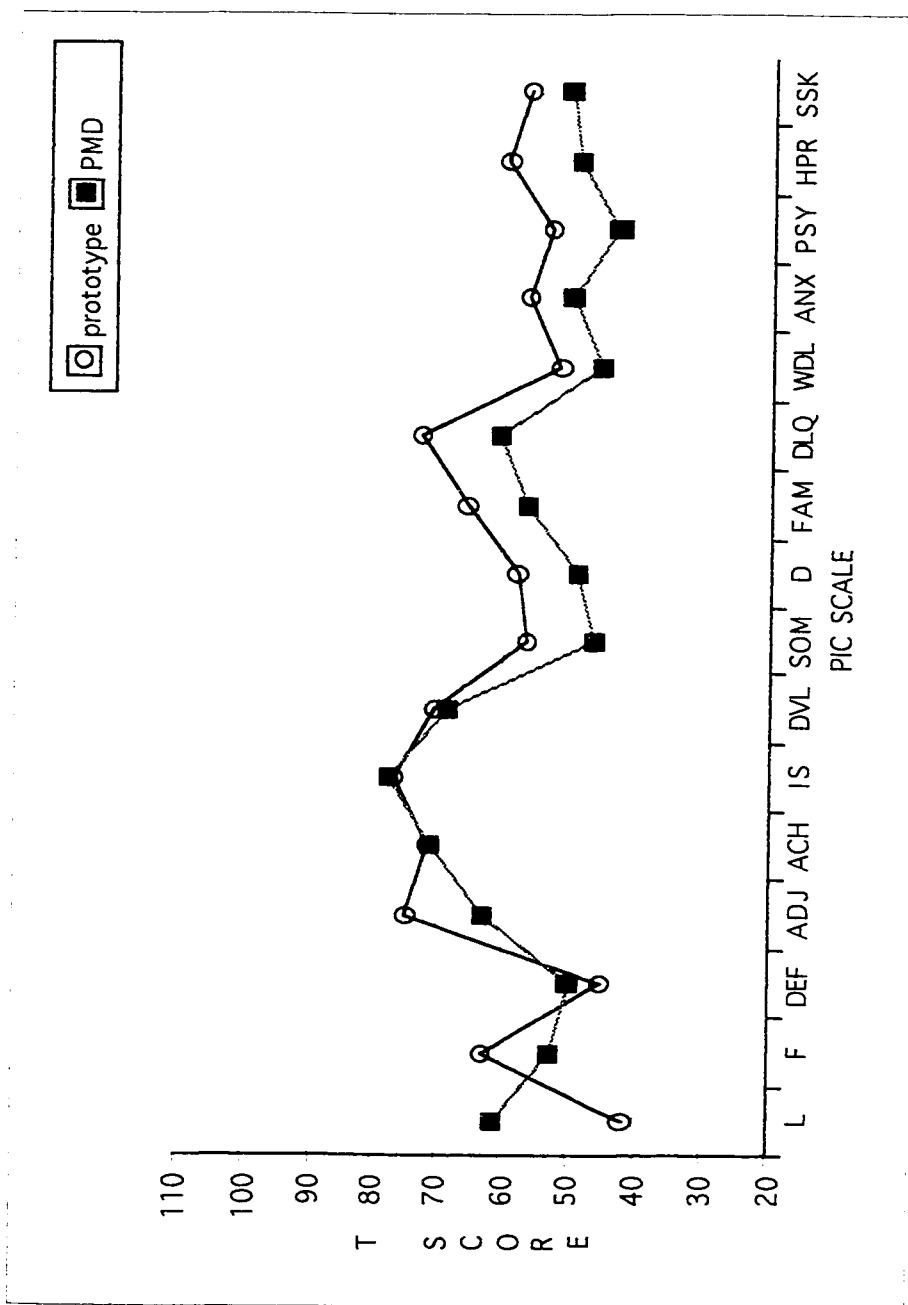
Figure 5. Mean PIC Profile for the Conduct Disorder Subtype. Abreviations are the same as for Figure 1.
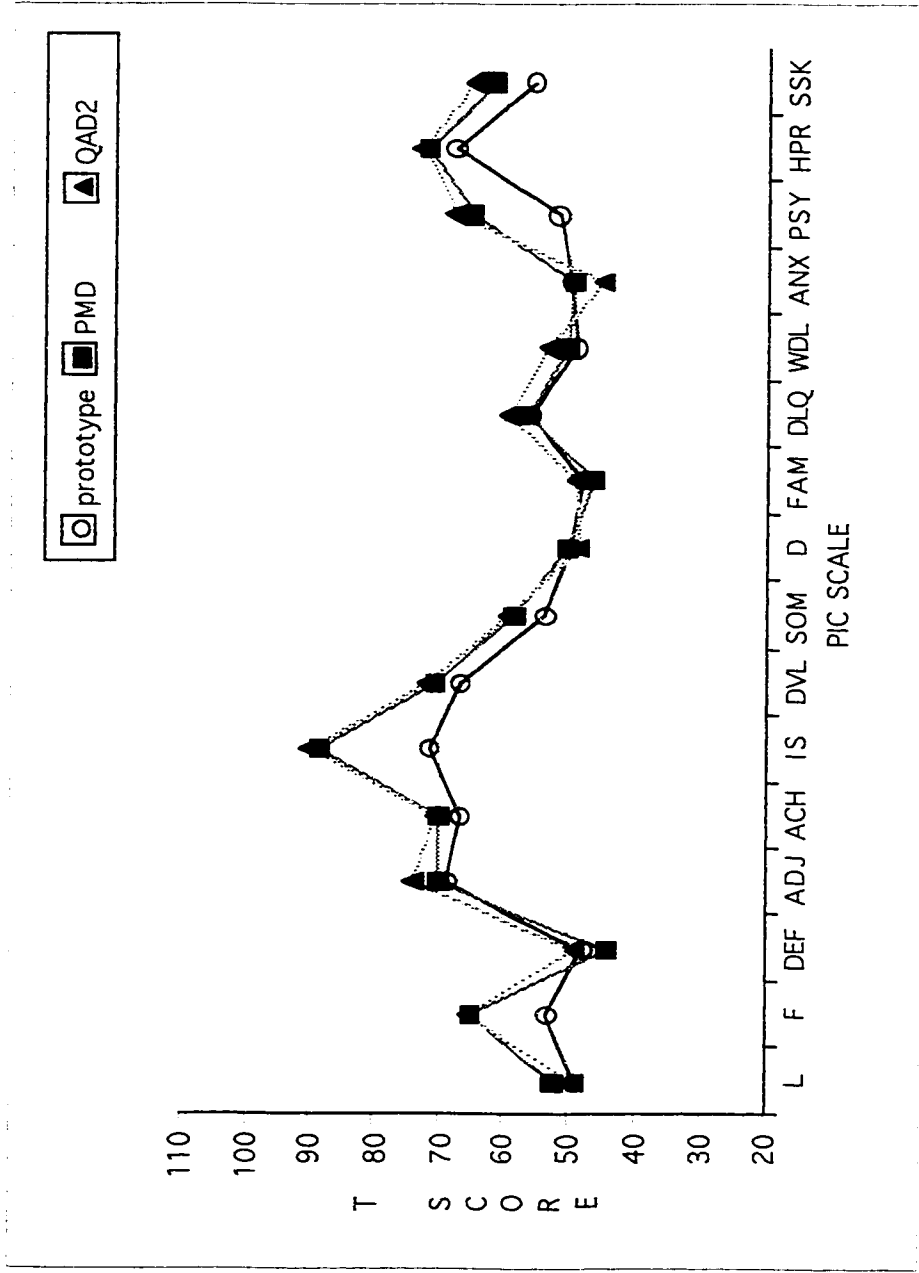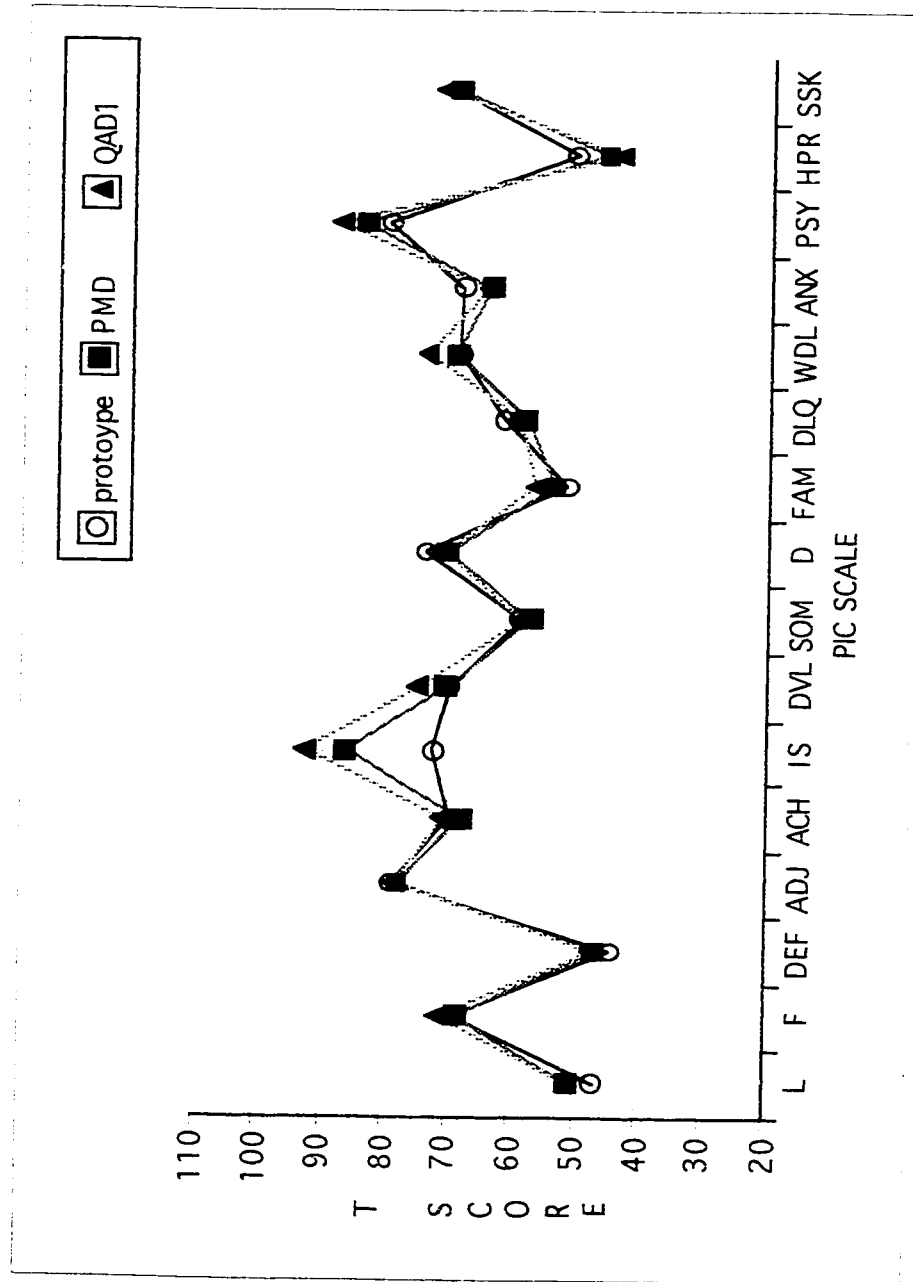
Figure 6. Mean PIC Profile for the Internalized Psychopathology Subtype. Abreviations are the same as for Figure 1.
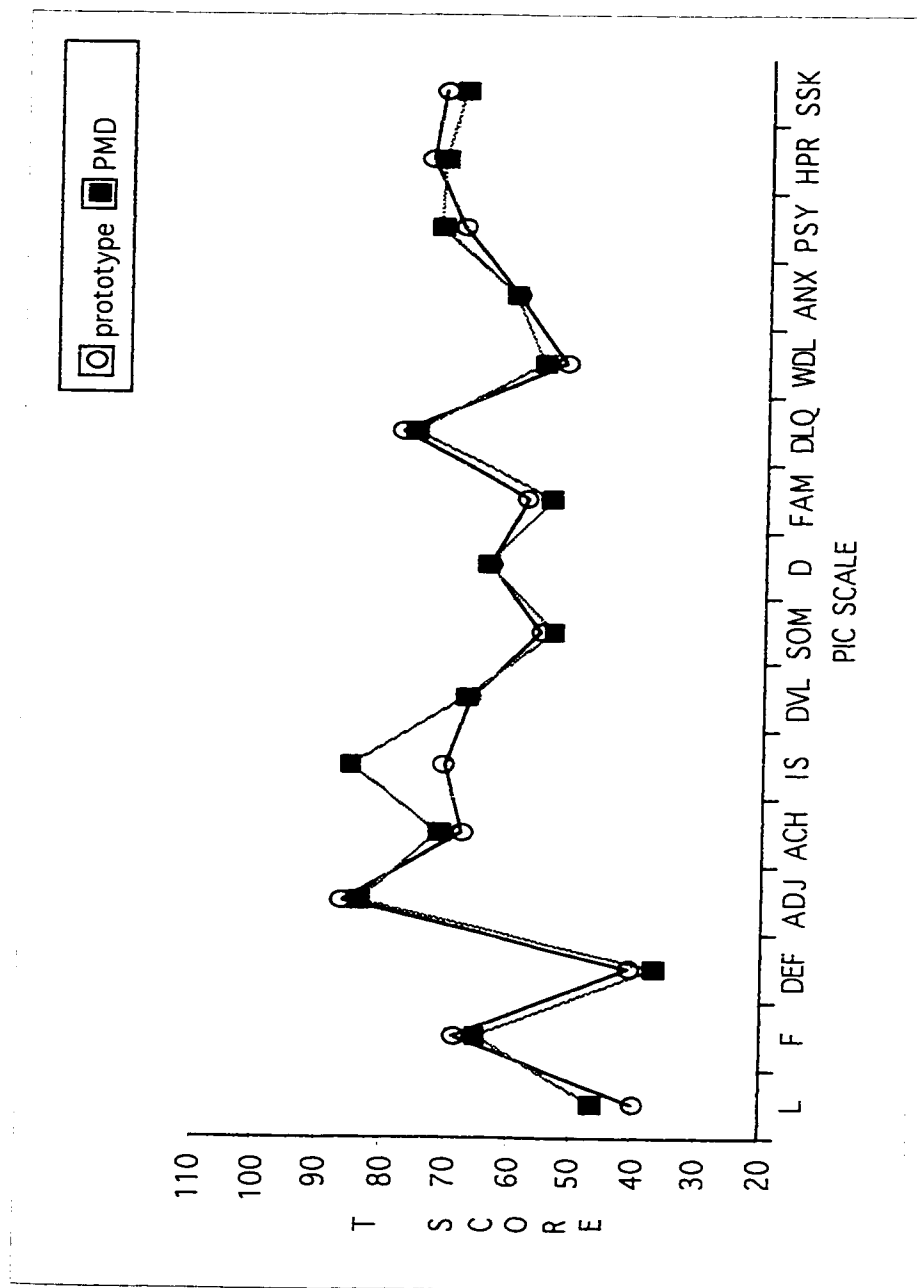
Figure 7. Mean PIC Profile for the Externalized Psychopathology Subtype. Abreviations are the same as for Figure 1.
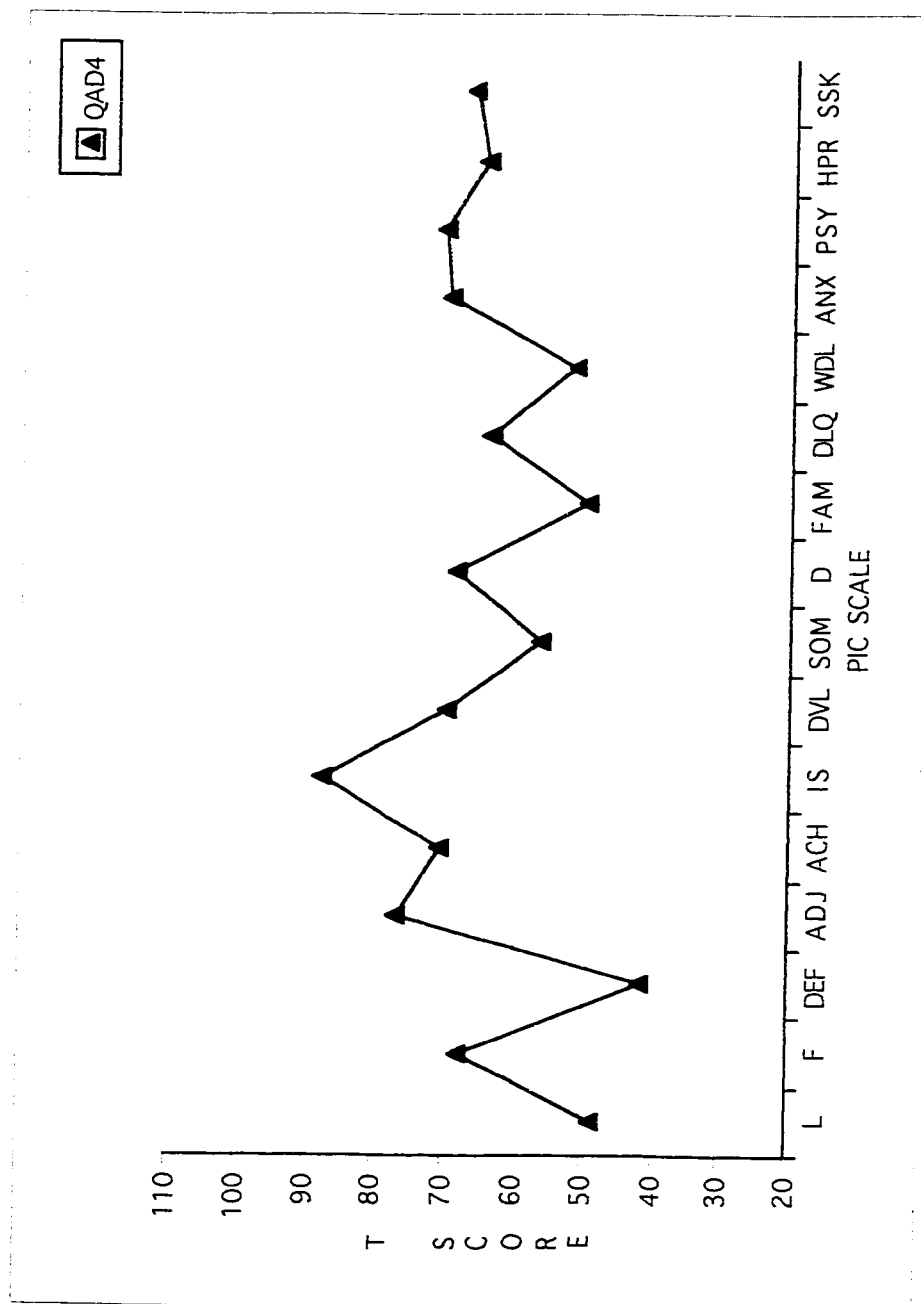
Figure 8. Mean PIC Profile for the Mild Anxiety/Depression Subtype. Abbreviations are the same as

for Figure 1

Table 2

Correlations Between Q-analysis Derived (QAD) PIC Subtypes and Prototypical PIC
Subtypes

	Q-analysis Derived Subtypes				
Prototypes	QAD1	QAD2	QAD3	QAD4	QAD5
Normal	.34	.47	.94	.41	.31
Mild Hyp.	-.29	.83	.47	.39	.18
Mild Anx.	.36	-.46	.06	.56	.01
Som. Con.	.20	-.01	.05	-.01	.93
Con. Dis.	-.33	.18	.57	.04	.26
Int. Psych.	.93	-.01	.31	.59	-.01
Ext. Psych.	-.12	.59	.21	.59	-.13

Note. Prototypes: Mild Hyp. = Mild Hyperactive, Mild Anx. = Mild Anxiety, Som. Con.
= Somatic Concern, Con. Dis. = Conduct Disorder, Int. Psych. = Internalized
Psychopathology, and Ext. Psych. = Externalized Psychopathology.

Table 3

Percentages of Assigned Subjects Within Prototypical, Q-analysis Derived (QAD), and Pofile-Matching Derived (PMD) Subtypes

Source	Subtype							
	N	MH	MA	SOM	CON	INT	EXT	MA/D
Prototype	24	19	12	9	7	16	14	
QAD	21	14		14		30		21
PMD	21	12	11	14	3	28	10	

Note. Subtypes: N = Normal, MH = Mild Hyperactive, MA = Mild Anxiety, SOM = Somatic Concern, CON = Conduct Disorder, INT = Internalized Psychopathology, EXT Psych. = Externalized Psychopathology, and MA/D = Mild Anxiety/Depression.
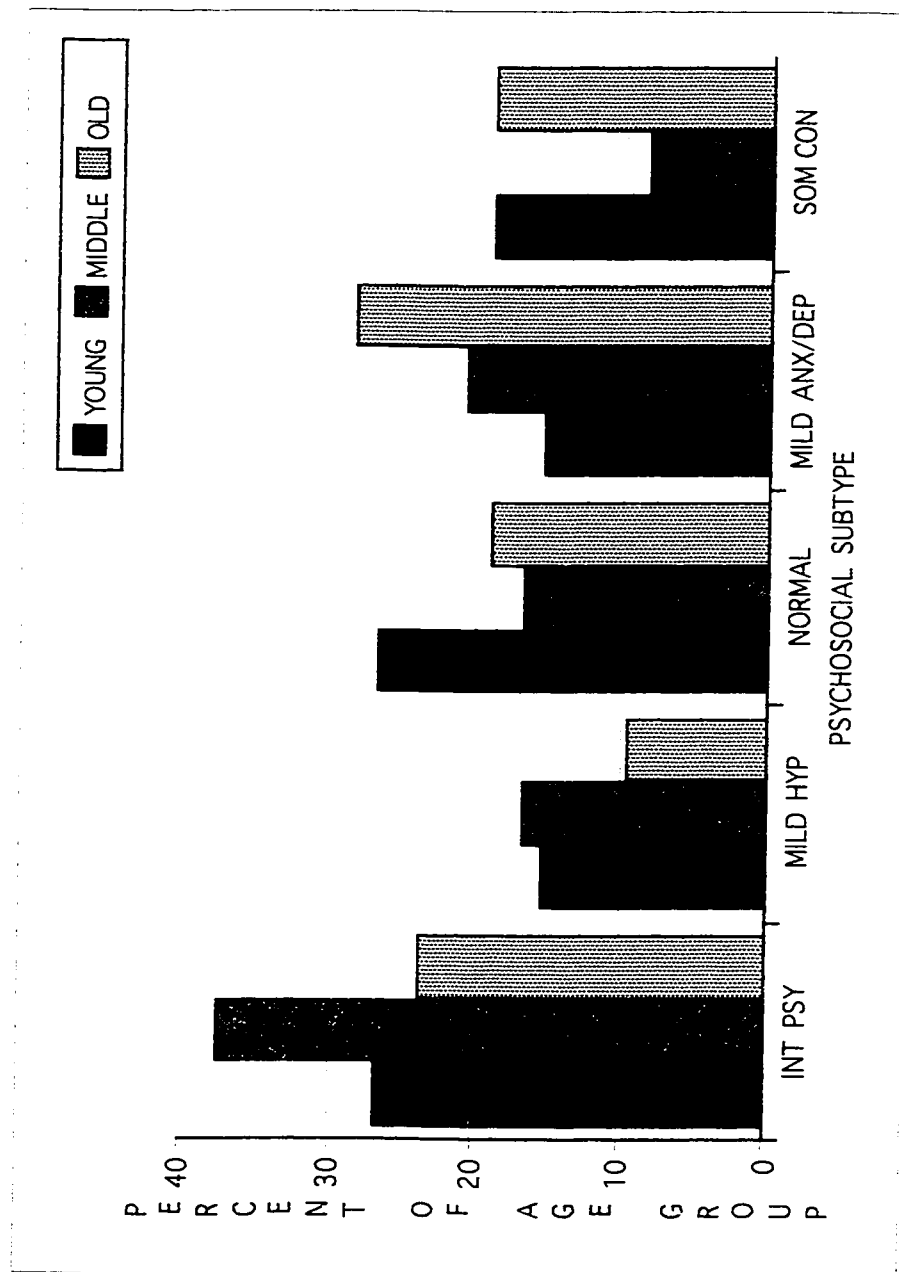
Figure 9. Percentage of Young, Middle, and Old Children Assigned to Q-analysis Derived Subtypes.

Psychosocial Subtypes: INT PSY=Internalized Psychopathology, MILD HYP=Mild Hyperactive,

MILD ANX/DEP=Mild Anxiety/Depression, SOM CON=Somatic Concern.

Table 4

Correlations Between Profile-Matching Derived (PMD) PIC Subtypes and Prototypical PIC Subtypes

Prototypes	PMD Subtypes						
	Normal	Mild Hyp.	Mild Anx.	Som. Con.	Con. Dis.	Int. Psych.	Ext. Psych.
Normal	.91	.39	.07	.14	.40	.51	.20
Mild Hyp.	.52	.89	-.28	-.02	.15	.02	.59
Mild Anx.	.10	-.27	.95	.32	-.13	.56	-.09
Som. Con.	.26	-.07	.16	.97	.11	.21	-.29
Con. Dis.	.40	.19	.15	.53	.55	-.13	-.04
Int. Psych.	.29	-.29	.42	.19	-.36	.97	-.05
Ext. Psych.	.21	.52	-.11	-.15	.31	.24	.95

Note. Prototypes: Mild Hyp. = Mild Hyperactive, Mild Anx. = Mild Anxiety, Som. Con. = Somatic Concern, Con. Dis. = Conduct Disorder, Int. Psych. = Internalized Psychopathology, and Ext. Psych. = Externalized Psychopathology.

Table 5

Mean WISC Verbal IQ, Performance IQ, and Full Scale IQ of Profile-Matching Derived
Subtypes

	Mean WISC IQs		
PMD Subtypes	VIQ	PIQ	FSIQ
Normal	76.8	82.9	77.0
Mild Hyperactive	77.3	81.7	77.3
Mild Anxiety	79.1	86.1	81.0
Somatic Concern	79.9	81.9	78.9
Conduct Disorder	82.0	77.3	77.7
Internalized Psychopathology	80.3	76.9	76.6
Externalized Psychopathology	78.3	83.3	78.7

Note. WISC = Wechsler Intelligence Scale for Children (Wechsler, 1949), FSIQ = Full
Scale Intelligence Quotient, VIQ = Verbal Intelligence Quotient, and PIQ = Performance
Intelligence Quotient; PMD = Profile-Matching Derived.

CHAPTER FOUR: DISCUSSION

Three main predictions about the psychosocial typology of children with BAIQ were made in this study. The first prediction involved the types or shapes and elevations of the PIC profiles of the various derived subtypes in relation to that of subtypes that have been previously found in children with LD. The second prediction was concerned with the proportions of cases falling within the various derived subtypes of children with BAIQ compared to that of children with LD. For the third prediction, the main focus was whether or not there were changes in psychopathology with age. This study utilized two methods to test these predictions: Q-analysis and profile-matching.

Prediction One

The first prediction was partially supported by the Q-analysis results. There were distinct similarities between the subtype structure that emerged from the Q-analysis and that of the prototypes. For example, similar to the corresponding prototype, the Q-analysis derived Normal subtype exhibited elevations only on the PIC scales that reflect developmental, intellectual, and academic achievement. Scales that are suggestive of psychosocial difficulties were within normal range. As expected, the other Q-analysis derived subtypes also evidenced elevations on scales that reflect developmental, intellectual, and academic achievement in addition to elevations on various clinical scales. The Somatic Concern subtype represented a good replication of the corresponding prototype and showed significant elevations only on the SOM scale. A good replication of the Internalized Psychopathology prototype also emerged from the Q-analysis. As expected, this subtype evidenced substantial elevations on PIC scales: ANX, D, WDL, and PSY. The Mild Hyperactive subtype adequately replicated the corresponding prototype, exhibiting the highest elevation on the HPR scale and a moderate elevation on DLQ. However, the Q-analysis derived Hyperactive subtype was somewhat more elevated on the PSY scale than was the corresponding prototype. It was also noted that the IS scales of all of the Q-analysis derived subtypes of children with BAIQ were substantially elevated compared to that of the prototypes. Because elevation on the IS scale is an indication of parental concern that the child's difficulties may be due to impaired

intellectual functioning, it is not surprising that children with BAIQ, exhibit higher elevations on this scale than do children with LD.

Some unexpected results emerged from the Q-analysis that were not in accord with the first prediction. Of the three most reliable subtypes (i. e., Normal, Internalized Psychopathology, and Externalized Psychopathology) that have been consistently revealed by previous studies using children with LD (e. g., Fuerst, et al., 1989; Fuerst, et al., 1990; Porter & Rourke, 1985), only the Normal and the Internalized Psychopathology subtypes emerged. In addition, a new subtype, Mild Anxiety/Depression, emerged. This new subtype contained features of mild forms of both internal and external types of psychopathology.

In support of the first prediction, the subtype structure that arose from the profile-matching method bore obvious similarities to that of the prototypes. All seven prototypical subtypes were derived; although, one subtype, Conduct Disorder, was somewhat small. The PMD subtypes were similar to the prototypical subtypes in both shape and elevation with only a few minor differences. For example, the PSY scales of the Normal PMD subtype was slightly elevated in comparison to the Normal prototype. The PMD Conduct Disorder subtype, while virtually the same shape, evidenced lower mean scores on the clinical scales than did the corresponding prototype. In agreement with the Q-analysis results, the PSY scale of the Mild Hyperactive PMD subtype was somewhat higher in comparison to the corresponding prototype. Also similar to the Q-analysis results, almost all the PMD subtypes exhibited substantially higher elevations on the IS scales than did the prototypical subtypes.

Some explanation is necessary to account for the fact that the subtype structure that was derived from the profile-matching method was almost identical to the prototypical subtype structure (at least in number, shape, and elevation of the subtypes); whereas, the subtype structure that was derived from the Q-analysis was somewhat different. In this sample of children with BAIQ, the application of the Q-analysis technique resulted in the formation of a new subtype, Mild Anxiety/Depression. The profile-matching algorithm does not allow new subtypes to form (Fuerst & Rourke, 1995); therefore, when this

method was applied, the subjects who were members of the Q-analysis derived Mild Anxiety/Depression subtype were either matched to one of the seven prototypes or deemed outliers. Examination of the fate of these subjects in the profile-matching results revealed that they were mainly matched to Externalized Psychopathology, Mild Hyperactive, and Mild Anxiety prototypes.

Prediction Two

The second prediction was partially supported by the Q-analysis results. The proportions of children with BAIQ that exhibited Normal, Mild, and Severe levels of psychopathology were not significantly different from that found in children with LD. Contrary to the second prediction, when the proportions of children exhibiting the three main types of psychopathology (i. e., Normal, External, and Internal) were compared with that of children with LD, significant differences were found.

The profile-matching results also only partially supported the second prediction. For example the PMD Normal and Mild Anxiety subtypes contained similar percentages of subjects as did the corresponding prototypes. The proportion of members within the PMD Mild Hyperactive, Somatic Concern, and Externalized Psychopathology subtypes was somewhat different from that of the prototypes but not extremely so. An unexpected finding was that the PMD Internalized Psychopathology subtype was the largest subtype of the typology and that it was almost twice as large as its corresponding prototype. In addition, there were definite similarities between the proportion of members falling within the various PMD subtypes and that of the Q-analysis derived subtypes. In fact, no significant differences were found between the two typologies in relation to both type or severity of psychopathology.

Taken together, the results of the two subtyping methods suggest that children with BAIQ may be more likely to exhibit the more extreme form of psychopathology of the internalizing type (i. e., Internalized Psychopathology) and less likely to exhibit psychopathology of the externalizing type especially in its more extreme form (i. e., Externalized Psychopathology) than are children with LD. However, children with BAIQ appear to exhibit the various levels of psychopathology (i. e., Normal, Mild, and Severe)

in similar proportion to that of children with LD. Therefore, it can be concluded that the psychosocial dimensions of children with BAIQ are similar to that of children with LD in a general sense, but there are some specific differences.

The finding that the psychosocial functioning of children with BAIQ is similar, in a general sense, to that of children with LD is consistent with the results of studies that investigated the psychosocial functions of special education students and found no differences between children with LD and those who were classified as educably mentally retarded (EMR; Gajar, 1979; Richmond & Blagg, 1985; Cullinan et al., 1979). As these studies compared undifferentiated groups of children with LD to undifferentiated groups of EMR children, it is conceivable that the specific differences were averaged out.

Regarding the finding that children with BAIQ may have a greater tendency to develop psychopathology with internalizing features than do children with LD, it is possible that children with BAIQ are less accepted by their peers than are children with LD, making it more likely for them to withdraw from social relations. Peer unacceptance and social withdrawal are known to be related to internalizing features of psychopathology such as anxiety and depression (Rourke et al., 1989). Children with LD have academic weaknesses but also possess some strengths that may help them gain acceptance. Children with BAIQ are more likely to be uniformly impaired, and therefore, it may be more difficult for them to gain acceptance. Another indication that children with BAIQ may have difficulties gaining acceptance are the higher elevations on the PSY scale of some of the subtypes of children with BAIQ compared to that of the prototypes. According to Wirt et al. (1984) elevations on this scale usually suggests that the child behaves in a manner that others find odd. In addition, elevations on this scale can also indicate social withdrawal.

In the same way, children with BAIQ may be less inclined to develop the more extreme forms of externalizing psychopathology such as delinquency because of their poor peer acceptance. Many items on the DLQ scale of the PIC are related to such behaviours as getting into mischief, destruction of property, and drinking alcohol. These are the types of behaviours that children most often do with other children rather than alone.

Prediction Three

With respect to the third prediction, both methods found no differences in the types or severity of psychopathology within the three age groups examined in this study, indicating that the patterns of psychosocial functioning of children with BAIQ are relatively stable across the ages of 7.0 to 14.9 years. While at odds with the notion that children who have learning problems have a tendency to develop more serious types of psychopathology with increasing age because of a progression of anxiety and self-consciousness brought on by criticism from other people, the present finding is consistent with the results of previous research regarding children with LD. Fuerst and Rourke (1995) found that profile shapes and elevations of psychosocial subtypes were comparable at three different age levels and that the proportion of young, middle, and old children in each subtype were also comparable. Tsatsanis et al. (1997) compared age levels among severity and type of psychopathology groups and found no differences. In agreement with the inference of the present study concerning children with BAIQ, both these investigations concluded that the patterns of psychosocial functioning of children with LD are stable across the age ranges that were examined.

Limitations and Future Directions

An understanding of the principal methodological limitation of the present study should be kept in mind when regarding the inferences and conclusions that were made. As multivariate subtyping techniques such as Q-analysis will always produce groupings even on random data (Fuerst et al., 1989), the internal validity (reliability) of the solution should have been assessed by applying the subtyping technique on two different sets of subjects. It was not possible to conduct this procedure in the present study because there were not enough subjects available who met the stringent selection criteria. Although the reliability of the solution was not assessed with a different sample, the similarities that were found between the Q-analysis and profile-matching results suggest that the solution may be quite reliable.

Conclusions and Clinical Implications

The main purpose of this study was to expand the knowledge of psychosocial

typology to include children with BAIQ. This was accomplished by comparing the resulting typology to that previously found in children with LD. Keeping the major methodological limitation of this study in mind, the results suggest that the psychosocial typology of children with BAIQ resembles that of children with LD in a broad sense. Similar to children with LD, approximately two-thirds of the children with BAIQ exhibited either normal psychosocial functioning or mild disturbances and one-third exhibited more severe forms of psychopathology. The two groups differed, however, in a specific sense. Although children with BAIQ exhibit many of the same aspects of psychosocial disturbances as do children with LD, they appear to be more inclined to develop internalized aspects of psychopathology and should be assessed regularly for signs of depression, anxiety, and social withdrawal.

With respect to treatment, the same kinds that are used to treat other children with psychosocial problems can likely be used for children with BAIQ such as: Cognitive Behavioural Therapy for depression (Kaplan, 1996); Behavioural Modification for anxiety and poor social skills (McIntosh, Vaughn, & Zaragoza, 1991); and medication and/or Behaviour Modification for hyperactivity (Kaplan, 1996). However, it may be necessary to simplify instructions and allow the child more time to grasp concepts.

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APPENDIX

Description of PIC Scales

Validity:

1) Lie Scale (L)

This scale consists of 15 items and was designed to identify a respondent's tendency to respond defensively. High scorers deny minor, commonly occurring behaviour problems and attribute only the most virtuous behaviours to their child.

2) Frequency Scale (F)

This is a 42-item scale that was constructed to identify deviant response sets such as random responding or exaggeration of symptoms. However, extremely severe symptoms can also result in elevations on this scale.

3) Defensiveness Scale (DEF)

The 23 items of this scale reflect the tendency for respondents to be defensive about their child's behaviour during an evaluation. It can also provide information about the respondent's tendency to be hostile, vigilant, and withholding of information, in addition to the respondent's general level of psychopathology.

Screening:

1) Adjustment Scale (ADJ)

This scale consists of 76 items and was developed as a screening measure to identify children in need of a psychological evaluation. It is also used as a general measure of psychological adjustment.

Clinical:

1) Achievement (ACH)

This is a 31-item scale that was constructed to assist in the identification of children whose academic achievement is significantly below age expectation, regardless of the child's intellectual capacity. This scale also reflects poor psychological adjustment including such symptoms as impulsivity, limited concentration, over or under assertiveness with peers, and disregard for parental expectations.

2) Intellectual Screening (IS)

This scale consists of 34 items and was constructed to identify children whose problems may be related to impaired intellectual functioning or specific cognitive deficits, and who may benefit from an individual intellectual assessment.

3) Development (DVL)

The 25 items of this scale are thought to reflect poor intellectual and physical development such as: delayed motor coordination, poor school performance, and the absence of special skills or abilities.

4) Somatic Concern (SOM)

This is a 40-item scale that was designed to be indicative of several health-related variables such as: frequency and seriousness of somatic complaints and illness, adjustment to illness, appetite and eating habits, sleep patterns, energy and strength, headaches and stomach aches, and also the physical bases of symptoms.

5) Depression (D)

This scale consists of 46 items and is thought to reflect childhood depression including such symptoms as: brooding, social isolation, crying spells, lack of energy, pessimism, anhedonia, concern with death or separation, sensitivity to criticism, indecisiveness, poor self-concept, and uncommunicativeness.

6) Family Relations (FAM)

This scale is comprised of 35 items which are reflective of family effectiveness and cohesion including such attributes as: level of parental role effectiveness, family involvement in community affairs, love and happiness in the home, emotional adjustment of parents, concern for the child's rights, and use of appropriate discipline.

7) Delinquency (DLQ)

This is a 47-item scale that was constructed to identify delinquent and anti-social behaviours. The items are suggestive of such characteristics as: inconsideration of the rights and feelings of others, resistance to the limits and requests of authority figures, poor frustration tolerance, irritability, and hostility.

8) Withdrawal (WDL)

These 25 items were designed to measure withdrawal from social contact and

reflects such characteristics as: social and physical isolation, shyness and fear of strangers, isolation from peers, lack of communication, emotional distance, and distrust of others.

9) Anxiety (ANX)

This scale consists of 30 items which were thought to measure various manifestations of anxiety such as: limited frustration tolerance, exaggeration of problems and concerns, irrational fears and worries, nightmares, and other behavioural and physiological symptoms of anxiety.

10) Psychosis (PSY)

These 40 items were designed to discriminate children with psychotic symptoms from those with less serious behaviour problems. The scale reflects such symptoms as: social withdrawal and isolation, limited social skills, cognitive disorientation, poorly developed pragmatic skills, depressive symptoms, and inappropriate affect.

11) Hyperactivity (HPR)

This scale is comprised of 36 items and was designed to identify children who exhibit symptoms of "attention deficit disorder with hyperactivity", specifically: impulsivity and restlessness, poor peer relationships, emotional lability, hostility, and discipline problems.

12) Social Skills (SSK)

These 30 items are thought to measure characteristics that reflect effective childhood social relationships such as: ability to lead and follow, self-confidence and poise in social situations, social comprehension and tact, and participation in organized activities.

(Wirt et al., 1977; 1984)

VITA AUCTORIS

Margaret Ralston was born on June 4, 1958 in Comox, British Columbia. She is the daughter of Stephan and Brigitte Baranyai. In 1976, she graduated with honours from Georges P. Vanier Senior Secondary School, Courtenay, B. C. She met and married Lee Ralston. After spending a number of years working and raising a family, she returned to academics part-time at the University of Victoria, Victoria, B. C. She became interested in psychology and neuropsychology in particular. During her final year of undergraduate studies, she worked under the supervision of Dr. Roger Graves for her honours research study. She completed her Bachelor of Science degree (with distinction in psychology) in 1996. Subsequently, she began her graduate training at the University of Windsor, Windsor, Ontario in the Clinical Neuropsychology Doctoral Program, pursuing her interest in the neuropsychology of Learning Disabilities under the supervision of Dr. Byron Rourke. She is presently a candidate for the Master of Arts degree.