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Emotion perception competence and its relationship to social skills, personality characteristics, and self-concept of children with varied cognitive abilities in a psychiatric sample.

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EMOTION PERCEPTION COMPETENCE AND ITS RELATIONSHIP TO SOCIAL SKILLS, PERSONALITY CHARACTERISTICS, AND SELF-CONCEPT OF CHILDREN WITH VARIED COGNITIVE ABILITIES IN A PSYCHIATRIC SAMPLE

By

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ABSTRACT

The interest in the present study was on examining the relationship between children's socio-emotional problems and visualspatial skills. Thirty-three male and female children from 9 to 14 years of age participated: 11 with nonverbal learning disabilities (NLD), 11 with verbal learning disabilities (VLD), and 11 psychiatric controls. Participants were compared on their ability to decode nonverbal expressions of emotion as measured by the Diagnostic Analysis of Nonverbal Accuracy Scale (DANVA; Nowicki & Duke, 1989). Subjects were also compared on a measure of self-esteem, the Piers-Harris Children's Self Concept Scale (PHCSCS; Piers & Harris, 1984) and on a self-report measure of emotional adjustment, the Personality Inventory for Youth (PIY; Lachar & Gruber, 1995). Comparisons of parental report of emotional adjustment were made using the Personality Inventory for Children-Revised (PIC-R; Lachar, 1982). The social skills of fifteen children, five from each group, were directly examined in a structured free-play setting. Peer interaction behavior was coded by trained raters blind to study methodology. Analysis of the DANVA results indicated that children in the NLD group demonstrated significantly lower rates of accuracy than did children in the VLD and control groups in decoding facial expressions and body gestures which conveyed the emotions of happiness, sadness, anger, and fear ($p < .05$). Comparison of behavior rating scale scores did not indicate significant differences between groups in terms of self-esteem and emotional adjustment. In general, children reported far fewer concerns and symptoms reflecting emotional disturbance and developmental/cognitive delay than did their parents and demonstrated a significantly more defensive reporting style ($p < .05$). Direct observations in a free-play setting revealed that children with nonverbal learning disabilities engaged in more isolative play than controls and showed a trend toward emitting fewer adaptive peer interaction behaviors than did comparison

children. Findings are discussed in terms of Rourke's (1989) model which suggests associations between impairment in visualspatial skills and the decoding of nonverbal emotion cues which may ultimately lead to impairment in social skills.

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CHAPTER I

INTRODUCTION

This study examines the relationship between children's socio-emotional problems and visualspatial skills. Research with rigorously defined samples of learning disabled (Rourke, 1989; White, Moffit, & Silva, 1992) and brain injured children (Voeller, 1986) has identified correlations between visualspatial deficits and deficient social skills, leading to the inference that this type of cognitive deficit prevents normal development of basic abilities, such as interpretation of facial expression, that form the foundation for a full repertoire of social skills and adaptive social behaviors. Although recommendations are often made based on these inferences, few studies have examined the validity of these conclusions through explicit examination of children's nonverbal social skills, and there is no study reported in the literature that investigates the inference In Vivo. Previous studies did not consider the actual interactions in which these children engage with peers, but rather, used the reports of parents, caretakers and teachers to judge social impairment. This study, through direct observations, examined children engaging in typical play activities similar to that expected on a day-to-day basis.

There is some evidence to suggest that samples defined broadly on the basis of cognitive skill discrepancies and academic achievement patterns, as opposed to deficits in specific areas, show socio-emotional functioning similar to that reported for children with known brain injuries or well-documented learning disability (Strang & Rourke, 1985; Wiig & Harris, 1974). The present study will examine nonverbal social skills in a psychiatric sample of children presenting with cognitive skill patterns characterized by relatively weak visualspatial skills or by relatively weak verbal skills. A second aim of this study is to assess actual social skills in a naturalistic setting.

This chapter will begin with a general overview of topics relevant to the present study and a summary of how these topics interrelate. Subsequent sections will review specific areas in detail including discussions of the decoding of facial expression, Nonverbal Learning Disability Syndrome (NLD), and research relating nonverbal communication skill deficits to social/emotional problems. Finally, a rationale for the present study will be presented.

Overview

Learning to recognize emotion is part of the normal development process and is a necessary component in the formation of social relationships (Ainsworth, 1979). The human face is thought to be the primary means for early development and exercise of emotions in a secure environment (Semrud-Clikeman & Hynd, 1990). As the infant watches expressions change on the face of a parent, differing emotional states begin to be associated with differing facial expressions. Similarly, the infant learns that the imitation of these various expressions produces an assortment of responses from the environment. Facial expressions can be viewed as a primary, nonverbal form of communication. The ability to decode facial expressions of emotion serves as the first step in the development of social responsiveness.

Social learning is involved in the reproduction of facial expressions as the infant learns, from the limited set of expressions on the adult's face, how and when to display various affects (Mayo & LaFrance, 1979). Research has shown that by 7 to 9-months of life, infants have developed 21 facial behaviors that have signal value, that is, that signal the infant's emotions and intentions. These facial behaviors are elements of eight expressive patterns that signal the following affects: physical distress, interest, joy, surprise, sadness, anger, disgust, and fear (Izard, Huebner, Risser, McGinnis, & Dougherty, 1980). Expressions of emotion play an important role in social interactions throughout life facilitating first, the

development of attachment to a caregiver, and later, the formation of affective bonds in social situations.

Nonverbal cues or expressions of emotion, such as tone of voice, posture, gesture, and facial expression, provide the affective information necessary for an individual to make socially appropriate behavioral responses. This process is known as social referencing (Klinnert, Campos, Sorce, Emde, & Svejda, 1983). Words from expressionless faces are difficult to interpret. It is not unreasonable to speculate that problems in decoding facial expression, and other nonverbal communications, are likely to have deleterious effects on the development of competence in interpersonal interactions. In fact, the notion of connecting deficiencies in decoding facial expression with social-interpersonal deficits has received support in research with groups of children (Edwards, Manstead, & MacDonald, 1984; Nowicki & Duke, 1989; Spence, 1987; Walker, 1981).

Clinically referred and psychiatrically hospitalized children, as a group, are reported by teachers and parents to have significantly lower levels of social competence and higher numbers of behavior problems as compared to non-referred children (Achenbach, 1979; Achenbach & Edelbrock, 1979; Achenbach & Edelbrock, 1981; Quay, 1986). The clinically referred population represents a heterogeneous group of children composed of those who exhibit emotional, behavioral, and/or learning problems. Two empirically derived, broad-band types of psychopathology have been identified: Externalizing and Internalizing (Achenbach & Edelbrock, 1978, 1986). Externalizers are described as undercontrolled and as evidencing aggressive or maladaptive social behaviors. In contrast, Internalizers are characterized by overcontrolled behavior such as anxiety, fearfulness, sadness, shyness, and social withdrawal (Achenbach, 1966). Deficiencies in learning and learning disabilities have been associated with both groups.

Children who experience difficulties in learning are more likely also to demonstrate deficiencies in socio-emotional adjustment than are their normally achieving peers (Maheady & Sainato, 1986; Werry, 1986; White, Moffit, & Silva, 1992). Learning disabled children with socio-emotional problems are more likely to be referred for intervention than those without them (e.g., Broder, Dunivant, Smith, & Sutton, 1981). Retrospective studies of troubled children have revealed high rates of learning disabilities among children and adolescents diagnosed as antisocial (Sabatino & Mauser, 1978), socially withdrawn (Bryan, 1974; Bryan & Bryan, 1977; Siperstein, Bopp & Bak, 1978), and delinquent (Keldgord, 1969; Morgan, 1979; Mulligan, 1969).

For the most part, the major broad-band disorders of children are common to both sexes and all ages and have been demonstrated using a variety of assessment instruments (Quay, 1986). Children within either of these classification groups have been noted to have poorer social/interpersonal skills when compared to non-disordered children (Werry, 1986). However, the nature and etiology of the social skill deficits found among these children differ, making the significance of these findings unclear. The possibility of a link between learning impairments, social skill deficits, and problem behaviors needs to be examined with comparisons between clinical groups demonstrating a variety of behavior disorders. The comparison of subsets of these clinically referred children, as opposed to contrasting referred with nonreferred children, can aid in the identification and remediation of deficient skills and may also provide useful information regarding the etiology of some emotional disturbances.

In summary, the ability to accurately interpret nonverbal expressions of emotion is a critical component in the development of competence in interpersonal interactions. The accurate interpretation of facial expression has been positively correlated with peer social status (Spence, 1987), while poor decoding of facial

affect has been associated with various emotional and behavior problems (Edwards, Manstead, & MacDonald, 1984; Walker, 1981). Children who experience either internalizing or externalizing types of psychopathology have poorer social/interpersonal skills than non-disordered children (Quay, 1986). Similarly, those who experience difficulties in learning are more likely to also demonstrate deficiencies in socio-emotional adjustment than are their normally achieving peers (Maheady & Sainato, 1986; Werry, 1986; White et al., 1992).

Rourke and his colleagues (1989), have inferred, based on the results of several related studies, that there is a group of children who are deficient in the capacity to acquire appropriate social skills because of an impairment in visualspatial skills. This impairment is thought to lead to deficiency in the ability to interpret facial expression and other nonverbal gestures. These children demonstrate a pattern of low visualspatial and mechanical arithmetic skills in comparison with reading (word recognition) and spelling abilities.

Other researchers have identified groups of children similar to those described by the Rourke group. McCauley, Kay, Ito, & Treder (1987) studied girls with Turner syndrome (i.e., phenotypic females with an absent or structurally abnormal second sex chromosome). These girls are characterized by short stature and physical anomalies such as webbing of the neck or digital defects. McCauley et al. compared girls with Turner Syndrome with short statured peers having normal sex chromosomes and found that girls with Turner Syndrome showed a pattern of poorer visualspatial skills, more immature social relationships, and more deficiencies in the discrimination of facial affect than did their short statured peers. The pattern of skills and deficits found among the girls with Turner Syndrome is consistent with that found among learning disabled individuals with visualspatial processing deficits and impairment in the interpretation of nonverbal information. The psychological problems and poor peer relationships noted among the girls

with Turner Syndrome are similar to those found among the children followed by Rourke and his colleagues.

Weintraub and Mesulam (1983) investigated a group of 14 adolescents and adults who presented with a pattern of academic failure, particularly in arithmetic, and who were referred for such concerns as school failure, inability to find employment, or behavioral difficulties. Chronic depression and/or extreme shyness were the most frequently reported problems. This group was distinguished by the finding that social difficulties, visualspatial deficits, and neurological evidence of right-cerebral dysfunction occurred together. In a sample of 13-year-olds, White, Moffitt, and Silva (1992) found specific-arithmetic disabled subjects to exhibit the greatest degree of overlap between internalizing types of psychopathology and impaired visualspatial skills.

Children exhibiting deficiencies in nonverbal decoding skills are thought to be at higher risk for the development of learning difficulties, significant impairment in social interactions, and even internalizing forms of psychopathology and increased risk for suicide than other learning disability types (Rourke, Young, & Leenaars, 1989). The experience of social failure is thought to worsen as a child ages and passes through childhood and adolescence when peer relationships become even more important. Although much research has been undertaken exploring the academic and cognitive patterns of abilities, and inferences have been made concerning the socio-emotional functioning of children with relative strengths in either verbal or visualspatial areas, relatively few studies have focused on the real life skills, actual emotion decoding skills, social skills, and self-concept of children fitting these cognitive patterns. No In Vivo studies of such children are reported in the literature. The aim of the present research study is to assess emotion decoding and real life social skills utilizing self-perceptions, the

perceptions of caretakers, and observations of children engaging in a play activity with peers.

Based on the literature reviewed above, it is reasonable to speculate that children with similar patterns of cognitive abilities may exhibit similar interpersonal and emotional problems. Children who exhibit a pattern of poor visualspatial skills in relation to verbal skills, are likely to demonstrate qualitatively different socio-emotional functioning than either those with poor verbal skills in relation to visualspatial skills or those who exhibit neither pattern. A great deal of research has examined the impact of specific cognitive skills on academic outcomes, and has led to development of remedial teaching techniques designed to compensate for the specific learning problems experienced by children. In contrast, very little research has focused on the sequelae of emotional features which often accompany learning deficits (Hooper & Willis, 1989).

While many children referred for psychiatric evaluation/treatment are found to have social, emotional, and learning deficiencies and, as a whole, do less well in these areas than do nonreferred children (Weintraub & Mesulam, 1983), it remains unclear how these skill areas interrelate. Children with different underlying patterns of cognitive skills may exhibit different problems in social skills, communication, and learning. An investigation of the emotional status, affective decoding skills, and social skills between clinical groups of children differentiated on the basis of general patterns of cognitive abilities could provide useful information regarding the social/emotional correlates and possible consequences of specific patterns of cognitive skills. Such an investigation represents a logical next step from that of the contrasting groups approach often employed by researchers who compare academically able children to those with identified learning problems. Research on this broadly defined group could facilitate development of

therapeutic interventions which could be more useful both for the learning-disabled and child psychiatric populations.

Weintraub and Mesulam (1983) note that children who are experiencing difficulties with social and interpersonal skills are often referred for clinical intervention/therapy related to emotional issues. However, these researchers note further that traditional forms of intervention may be ineffective in the treatment of individuals with underlying deficits in identifying affect in interpersonal situations. The focus on the present research endeavor is to examine a group of clinically referred children who demonstrate a pattern of cognitive ability similar to that found among the nonverbal learning-disabled children identified by other researchers (Johnson & Myklebust, 1967; Rourke, 1989; White, Moffitt, & Silva, 1992; Wiig & Harris, 1974). These children will be assessed on their ability to decode nonverbal emotion cues, on their peer and social relationships, and on their level of self-esteem. For a subset of the sample, actual social interactions within a naturalistic setting will be examined.

This chapter will present a brief review of the literature on the interpretation of facial expression and other nonverbal gestures. Research associating social/emotional impairment with deficient nonverbal decoding skills and learning disabilities will also be addressed.

Decoding of Facial Expressions

Adults. Facial expressions provide information about the people around us. The decoding of expressions on the face is part of understanding the intentions and feelings of others and is related to the ability to read emotions (Walden & Field, 1982). Researchers on adult facial expressions have consistently managed to evoke and evaluate eight basic expressions under a variety of conditions (Darwin, 1877; Ekman & Friesen, 1971; Izard, 1971; Tomkins & McCarter, 1964). These expressions include the affects of joy, distress, interest, surprise, fear, anger,

shame, and disgust (Field & Walden, 1982). Darwin (1872) proposed universal facial expressions of emotion on the basis of his evolutionary theory. In cross cultural studies of facial expressions of emotion, Ekman (1970) found support for the universality of six emotions: happiness, sadness, anger, fear, surprise, and disgust. Facial discrimination studies suggest that positive expressions are more reliably discriminated than negative expressions and that discrimination improves with age (Charlesworth & Kreutzer, 1973). Joy, or happiness, is the most reliably recognized of the basic facial expressions (Kirouac & Dore, 1985). The accuracy of recognition declines in the following order: happiness, sadness, anger, and neutrality (Felleman et al., 1983).

While not all studies report gender differences, when gender differences are found, females are more often reported to be better decoders and encoders than males (Buck, Miller, & Caul, 1974; Hall, 1978; Zuckerman et al., 1975). The perception and production or decoding and encoding of facial expressions appear to be related skills. Adults identified as good encoders are also found to be good decoders (Zuckerman, Lipets, Koivumaki, & Rosenthal, 1975).

Children. Research indicates that children can reliably identify emotions associated with facial expressions (Izard, 1971). Developmental differences are found in studies of the perception of emotion or decoding of facial expression in children. Based on observations of his infant son, Charles Darwin (1877) related the development of emotion to innate factors. Darwin observed that emotion expression was the first means of communication between mother and infant and that expressions were the first tool of socialization. Infants as young as 6-months of age have been found to respond differentially to sad expressions as compared with happy, angry, and neutral expressions (Charlesworth & Kreutzer, 1973).

In general, studies of children's facial decoding skills find results similar to those found among adults. That is, positive expressions are more reliably

discriminated than negative expressions, happiness is the most easily identified facial expression (Buck, 1975; Glitter, Mostofsky, & Quincy, 1971), discrimination improves with age, and, when occasional gender differences are found, females are identified as better decoders and encoders than males (Izard, 1971; Kirouac & Dore, 1985). According to Bradshaw and McKenzie (1971), a child's learning of adult-like facial stereotypes is essentially accomplished by age 5. These researchers contend that, as children develop, they begin to pay particular attention to facial features that relay information about emotional states and form conceptual categories of expressions (e.g., "happy", "sad"). Eventually, verbal labels are attached to these expressions in order to aid in the processing of facial information. The ability to recognize facial expressions of emotion appears to improve up to the age of 10 years (Field & Walden, 1981; Frilund et al., 1987).

Decoding of Facial Expressions and Social Functioning

Research has demonstrated that nonverbal vehicles of communication, facial expressions in particular, are basic components of social interaction (Blanck, Buck, & Rosenthal, 1986; Feldman, White, & Lobato, 1982) and are related to emotional adjustment (Walker, Marwit, & Emory, 1980). Spence (1987) reports that the ability of kindergartners to accurately read emotions on the face is positively correlated with peer social status. In addition, deficits in the decoding of facial affect by children are associated with a variety of emotional and behavior problems (Edwards, Manstead, & MacDonald, 1984; Walker, 1981). It is reasonable to hypothesize that some individuals who demonstrate deficits in social-interpersonal relations may also have less developed nonverbal decoding skills.

Since the vast majority of emotional information is conveyed through nonverbal channels (Mehrabian, 1968) it is necessary, within a given social situation, that an individual be able to take in, be aware of, and interpret social

information conveyed via nonverbal cues, (i.e., facial expression, posture, gesture, and tone of voice). If unable to do so, one is subject to experiencing social failures. Studies on the meaning conveyed through verbal and nonverbal communication channels indicate that visual and vocal cues (e.g., tone of voice) provide more useful information for making accurate judgements about a person's emotional state than does the content of verbalizations (Bugental, Kaswan, & Love, 1970; Depaulo, Rosenthal, Eisenstat, Rogers, & Finkelstein, 1978).

Differences in decoding facial expressions of emotion have been noted in adult clinical populations. Schizophrenics have been found to perform less well in the recognition of facial affect when compared to anxious-depressed patients (Walker, 1981), anxious-neurotics (Mandal & Rai, 1987), and nonpatient controls. Similarly, Rosenthal, Hall, Archer, DiMatteo, and Rogers (1979) utilized the Profile of Nonverbal Sensitivity (PONS) to demonstrate that psychiatric and alcoholic patients were deficient in their sensitivity to nonverbal cues. It is unclear if deficiency in nonverbal reasoning skills contributes to serious emotional illness or if illness impairs the ability to attend to and process nonverbal information.

Studies of children representing diverse age groups indicate that the decoding of facial affect is related to social/interpersonal skills. In a study relating school adjustment to the ability to express and recognize basic facial expressions, Zuckerman and Przewuzman (1979) found that preschoolers rated as better adjusted were superior in their ability to label and model emotions depicted on photographs and slides. Spence (1987) found positive correlations between kindergartners to accurately read emotions on the face and their peer social status. Results are similar with older children. In a study of 8 to 11-year-old children rated as higher in sociometric status, Edwards, Manstead, and MacDonald (1984) found that high status children were superior to low status children on tasks of decoding facial expression. Finally, Feldman, White, and Lobato (1982) compared

the nonverbal decoding skills of emotionally disturbed adolescents and normal controls. They found that the normal controls were more accurate encoders and decoders than were the emotionally disturbed adolescents; however, both the normal controls and the emotionally disturbed adolescents high in social skills were more proficient than the emotionally disturbed adolescents low in social skills.

There is also evidence that the inaccurate encoding of social cues can lead to unacceptable social behavior. Dodge (1980) investigated the social cognitions of aggressive children and concluded that, when presented with ambiguous stimuli, such children tend to attribute hostile intentions to peers. Dodge's research established a relationship between social information processing and aggressive behavior. In a similar manner, children who are ill equipped to read nonverbal social cues may exhibit inappropriate social behaviors. These findings provide support for the notion that more adaptive social adjustment is related to better nonverbal decoding and encoding ability.

Nowicki and Duke (1989; 1994) have conducted more recent research relating nonverbal communication skill deficits to social/emotional problems. These investigators have developed a scale, the Diagnostic Analysis of Nonverbal Accuracy (DANVA), which measures the ability to decode and encode nonverbal cues (facial expressions, postures, gestures, tone of voice). This scale was utilized to assess over 1000 children ages 6 to 10. General conclusions are similar to those reported in the previously noted studies: (1) the expression and reception of nonverbal information improves with age; (2) lower DANVA accuracy scores are related to negative sociometric ratings and ineffective peer interactions; and (3) in general, emotionally disturbed children and adolescents are less accurate in the decoding of nonverbal social information than are those not so defined. Groups

were found to differ both in the recognition and production of facial expressions and in the recognition and expression of emotion through tone of voice.

Further, in a summary and discussion of 14 separate studies of children using the DANVA, Nowicki and Duke (1994) cite support for the construct validity of the measure, particularly for the receptive subtests. These studies included children who ranged in age from 6 to 16 years and who represented individuals with and without emotional impairment. Additionally, in using the DANVA FACES 2, a measure which varies the levels of affective intensity (low, middle, high) conveyed in four basic emotions (happiness, sadness, anger, and fear), Nowicki and Carton (1993) reported significant correlations ($p < .05$) between the DANVA FACES 2 and both adult and child facial expression stimuli in the original DANVA.

While DANVA accuracy scores correlated significantly with indicators of personal and social adjustment and academic achievement, no significant correlation was found between DANVA subtest scores and IQ scores. Similarly, in a study of self-esteem, Feig (as cited in Nowicki & Duke, 1994) found a significant correlation between Piers-Harris (Piers, 1984) self-concept and receptive DANVA facial expression scores in third grade children. These studies provide evidence for the validity of the DANVA as measures of skills distinct from cognitive ability.

Deficient social relationships have also been related to visualspatial processing deficits. As described earlier, McCauley et al. (1987) reported both cognitive problem solving deficits and immature, inadequate social relationships among girls with Turner syndrome. The pattern of skills and deficits noted in these girls is found to be similar to that of some learning-disabled individuals. The pattern is characterized by significantly poorer visualspatial skills, as measured by the performance subtests of the Wechsler Intelligence Scale for Children-Revised

(Wechsler, 1974), in comparison to verbal subtests of the same measure. Similarly, deficits in other spatial processing tasks are noted as well (McCauley et al., 1987). Reske-Nielsen, Christensen, and Nielsen (1982) hypothesized that the consistent spatial deficits found in girls with Turner syndrome may be related to right-hemisphere dysfunction. The right-hemisphere is thought to mediate such visualspatial tasks as the recognition of shape and form, and spatial orientation.

Studies of the psychological problems of girls with Turner syndrome have revealed immaturity and poor peer relationships (McCauley, Ito, & Kay, 1986). McCauley et al. (1987) found evidence of visualspatial processing deficits and deficient social skills in girls with Turner syndrome. These girls performed less well on tasks involving the discrimination of facial affect than did their short-statured counterparts. These researchers concluded that deficits in the ability to discriminate facial affective cues and consequent poor social skills may be related to a single mechanism: right-hemisphere dysfunction.

It is important to note here that the majority of early studies investigating the interpretation of facial affect used static stimuli (e.g., photographs). However, in a comparison of facial expression studies, Cook (1971) demonstrated that films and live presentations produced more accurate responses than photographs. Consequently, some later investigators utilized videotaped presentations (Wiig & Harris, 1974). More recent research on the social problem solving skills of children suggests that they respond differently to videotaped presentations of provocations involving same-aged peers than they do to In Vivo provocations simulated by a peer confederate (Vitaro & Pelletier, 1991). Few between group differences were found between maladjusted and well adjusted children when asked how they would react to videotaped provocations involving same aged peers. However, when exposed to actual provocations simulated by a peer, the maladjusted group demonstrated more verbal and nonverbal aggressive responses.

Therefore, it is important to observe and systematically document behavior in actual social interactions to supplement laboratory task performance.

In summary, there is significant support for the hypothesis that the ability to decode nonverbal cues, particularly facial expression, is related to social competence and interpersonal skills. There is also support for the notion that the poor social/interpersonal skills found in some clinical groups of children with emotional and behavior problems are related to deficits in visualspatial abilities.

Learning Disabilities and Social Functioning

The relationship between socio-emotional disturbance and learning disabilities in children and adolescents has been well studied. The results of studies contrasting groups of learning-disabled children with those of normally achieving peers are sometimes contradictory. In a review of 22 studies comparing the nonverbal communication skills of learning disabled and non-learning disabled children, Maheady and Sainato (1986) reported that 76% found significant differences in social skills which favored non-learning disabled children. The remaining 24% of the studies showed no significant differences. Studies of self-esteem are similarly inconsistent. Halechko (1977) and Black (1974) found self-esteem to be lower among learning-disabled children. However, Silverman (1978), utilizing the same instrument as Black, found no between-group differences. Rourke (1989) cites the failure to utilize a consistent definition of learning disabilities, to use objective measures of maladjustment, to consider developmental issues, and to consider the heterogeneity of the learning-disabled group as contributing to these inconsistent findings.

The view, put forth by Rourke (1989), that specific patterns of central processing abilities and deficits cause specific manifestations of learning-disabilities as well as specific forms of socio-emotional disturbance and social competence deficiencies, is relevant to the present investigation. Such a

relationship could explain the inconsistent findings noted in studies of the relationship between socio-emotional disturbance and learning problems. Since clinically referred children and adolescents, as a whole, demonstrate increased learning problems and poorer socio-emotional adjustment relative to their non-referred peers (Werry, 1986), it would be beneficial to explore this hypothesis within a psychiatric population.

The learning-disability term is applied broadly to encompass a heterogeneous group of individuals. The current definition of specific learning disability in the state of Michigan (see Appendix A) includes such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia (Michigan State Board of Education, 1986). The learning-disability definition proposed by the Interagency Committee on Learning Disabilities (ICLD, 1987) includes deficiencies in the acquisition of social skills presumed to be directly related to Central Nervous System (CNS) dysfunction. Weller and Strawser (1987) note that existing learning-disability definitions refine descriptive symptoms, recognize social skill deficits, suggest a neurological origin, and point out the chronic nature of some learning-disabilities. Presently, researchers are utilizing a method called subtyping when studying the academic and/or social difficulties of some children. Subtyping refers to an attempt to identify children with common patterns of strength and weakness. One kind of subtyping analysis, referred to as neurological subtyping, is based on the assumption that various types of learning disabilities may be associated differentially with specific patterns of CNS functioning (Hooper & Willis, 1989).

Three primary subtypes of learning disabilities have been consistently reported on the basis of achievement test scores, reading subskill test scores, and/or neuropsychological measures (Bakker, 1990; Doehring & Hoshko, 1977; Fletcher & Satz, 1985; Morris, Blashfield & Satz, 1986). These groups are (a)

General Learning disability, (b) Verbal Learning Disability (VLD), and (c) Nonverbal Learning Disability (NLD). Each group represents a differing pattern of cognitive strength and weakness and is presented in Table 1.

The Wechsler Intelligence Scale Revised for Children (WISC-R; Wechsler, 1974) has been widely used in clinical practice. The discrepancy between verbal IQ (VIQ) and performance IQ (PIQ) is a commonly interpreted measure from this test. Evidence for large VIQ - PIQ discrepancy as an indicator of cognitive dysfunction has been supported by a number of studies (see Matarazzo, 1972, Table 13.1). In a review of several studies, Guertin, Ladd, Frank, Rabin, and Hiester (1966) reported lower PIQ scores to be correlated with right-hemisphere impairment, whereas lower VIQ scores were correlated with inefficiency in the left-hemisphere.

The VIQ - PIQ discrepancy is utilized in the diagnosis of specific learning disabilities in conjunction with measures assessing academic achievement levels and social skills. The size of V - PIQ differences required for statistical significance is 8.3 points ($p < 0.15$) and 11.3 points ($p < 0.05$) [Wechsler 1991, p. 261]. Kaufman (1994) reports that two out of five normal children exhibit a discrepancy of 11 or more points ($p < 0.05$) and that one out of four exhibit a 15 or more point discrepancy ($p < 0.01$). Similarly, discrepancies of 18 - 19 points occur for about 15% of the population. However, Kaufman considers a difference of 12 points to be worthy of explanation, and posits that insistence on a difference of a 15 point V - PIQ discrepancy before inferring a meaningful difference between a child's verbal and nonverbal abilities is overly conservative. Similarly, Kaufman states that the frequency of occurrence of a V - PIQ discrepancy must be interpreted within the context of whether the V - PIQ difference corresponds to a meaningful aspect of a child's functioning.

Despite the focus of many learning specialists on the academic or cognitive

Table 1

Primary Learning Disability Subtypes

	Wechsler VIQ-PIQ	Reading	Spelling	Arithmetic
General Learning Disabled	V = P	Impaired	Impaired	Impaired
Verbal Learning Disabled	V < P (HP-LV)	Impaired	Impaired	Less Impaired
Nonverbal Learning Disabled	V > P (HV-LP)	Intact	Intact	Impaired

Note. HP = High Performance IQ; LP = Low Performance IQ; HV = High Verbal IQ; LV = Low Verbal IQ.

skills of the learning-disabled child, some consider social perception deficits to be the most serious type of learning-disability (Minskoff, 1980). In an early description, Johnson and Myklebust (1967) defined a social perception disability as an inability to identify and recognize the meaning and significance of the behavior of others. Social perception deficits are found to be related to lowered social status and to peer and teacher rejection in the classroom setting (Bryan & Bryan, 1978). The negative consequences of poor social skills magnify as a child grows and moves into adulthood. Social skills become increasingly important and have been identified as a factor in post-school success and in peer popularity (Edmonson, DeJung, & Leland, 1965; Krudek & Krile, 1982). Some researchers looking for causal factors in social perception deficits have noted the inability to effectively understand and utilize nonverbal communication (Bryan, 1977).

The right-hemisphere is thought to serve an important role in the processing of visualspatial information and in the expression and interpretation of emotion (Mesulam, 1985; Ross, 1981). Deficits in the interpretation of emotion and in the correct identification of facial expression have been found in right-hemisphere damaged adults (Borod, Koff, & Caron, 1983; Ross & Mesulam, 1979). Denkla (1978) found that children with right cerebral dysfunction (left-sided neurological signs) experienced rejection by peers. Similarly, Weintraub and Mesulam (1983) found right-hemisphere deficient adolescents and adults to experience severe social interaction disturbances. Voeller (1986) reported on a group of children with neurological patterns consistent with right-hemisphere damage or dysfunction. These children were found to be characterized by the following: impairment in the ability to perceive the emotional state of others, better verbal than visualspatial abilities, and a pattern of higher reading and spelling than arithmetic achievement test scores. However, neither of these studies used a

comparison group and both used informal measures of socio-emotional functioning limiting reliability and validity.

In summary, there is research suggesting that right-hemisphere dysfunction is related to deficits in visualspatial skills which are necessary for the accurate interpretation of facial expression and other nonverbal cues. It is hypothesized that such a deficit leads to impairment, not just in learning, but in the ability to perceive the emotional state of others and consequently, in the ability to participate successfully in social interactions.

Nonverbal Learning Disability: Theoretical Underpinnings

Johnson and Myklebust (1971) provided early descriptions of the characteristics of the nonverbal learning-disabled child. These characteristics included the inability to comprehend the significance of one's social environment or to accurately interpret gestures, facial expressions, touches, or the subtlety of physical interactions. Arithmetic deficiencies and deficits in visualspatial organization were also characteristic of the nonverbal learning-disabled child. In addition, Wiig and Harris (1974) found evidence linking impaired performance in the interpretation of emotion and visualspatial tasks to nonverbal learning-disability. Semrud-Clikeman and Hynd (1990) suggest that nonverbal learning-disabilities may be more handicapping than verbal deficiencies which do not impact on nonverbal experiences. These researchers suggest also that impairment in the ability to interpret facial expression, gestures, and prosody would increase risk for failure in social situations.

Rourke (1989) compiled a comprehensive description of the Nonverbal Learning Disability Syndrome (NLD). The model was developed by Rourke and his colleagues out of a series of studies spanning a period of 20 years. In the formulation of this model, an attempt was made to subtype, or group, children homogeneously on the basis of cognitive functions such as memory, attention, and

visualspatial abilities. Furthermore, an effort was made to link these patterns of central processing abilities to predictable behavior/social manifestations and academic disabilities.

The Goldberg and Costa model. The NLD model is based on the work of Goldberg and Costa (1981). These researchers point out structural differences between the left and right cerebral hemispheres. The right cerebral hemisphere, in comparison to the left, has larger areas of associative cortex, interregional neuronal connections, and comparatively more white than grey matter. Goldberg and Costa suggest that the intrarregional pattern of neuronal connections found in the left-hemisphere is effective in the processing of either a single mode of stimuli or in the execution of discrete motor acts. In contrast, Goldberg and Costa suggest that the greater interregional neuronal connections of the right-hemisphere are useful in the processing of complex information or input. The job of the right-hemisphere would then be to integrate input from a number of modalities to form a coherent whole out of novel stimuli and, ultimately, to relate it to a preexisting descriptive system (intermodal integration), whereas, the job of the left-hemisphere would be to handle familiar, previously learned, or already codified stimuli (intramodal integration) such as natural language or rote verbal material. There is an implied pattern of right to left movement in the Goldberg and Costa conception of brain functioning in that novel material is initially integrated by the right-hemisphere and, once codified, is governed by the left-hemisphere.

Rourke modified the Goldberg and Costa model, which was based on adult samples, to encompass a developmental perspective and to explain the phenomenon of the nonverbal learning-disabled individual. He and his colleagues argue that it is the destruction or dysfunction of white matter (which is necessary for intermodal integration and more prominent in the right hemisphere) that produces the nonverbal learning disability. Thus, the NLD individual fails to

accurately integrate information because of limitations in the capacity for intermodal integration in the right cerebral hemisphere.

Individuals thought to fit the NLD syndrome characterization (see Appendix B for descriptive features) typically demonstrate a pattern of lower Performance IQ scores relative to Verbal IQ scores on the Wechsler Intelligence Scale for Children (Wechsler; WISC, 1949; WISC-R, 1974; WISC-III, 1991). Similarly, a pattern of relatively high scores on both the reading and spelling subtests of the Wide Range Achievement Test (Jastak & Jastak; WRAT, 1978; Jastak & Wilkinson; WRAT-R, 1984) as compared to scores on the arithmetic subtest are obtained. Additionally, deficient social relations and increased risk for psychopathology distinguished by anxiety, social withdrawal, and depression as measured by the Personality Inventory for Children (PIC; Wirt, Lachar, Klinedinst, & Seat, 1977) are noted (Rourke, 1987).

In an effort to identify criteria useful in identifying the NLD syndrome in children, Harnadek and Rourke (1994) selected, from a clinically referred sample, children who exhibited the NLD syndrome and children with reading and spelling disabilities (R-S) to compare with a group of non-clinical subjects with neither perceptual nor learning difficulties (NC). Of the predictor variables used, the strongest correlations occurred with the Visual-Perceptual-Organizational variable (.60), which was found to discriminate the NLD group from the other two groups, and WRAT Reading (.79), which distinguished the R-S cases from NLD and NC subjects.

Balance model. The importance of the right-hemisphere in intermodal integration and the suggestion that a shift from right to left hemispheric control of functions occurs, receives additional support from the balance model proposed by Bakker (1979, 1992). Bakker adopts a developmental perspective in the learning-to-read process. The Bakker model assumes that the right cerebral hemisphere

mediates during the beginning stages of the learning to read process when reading skills are more visual-perceptual and less linguistic. As linguistic complexity increases the left cerebral hemisphere takes over the function of mediating reading strategies thus producing a right to left shift. Bakker identifies two groups of learning deficits which are labeled P-type dyslexics (perceptual deficits) and L-type dyslexics (linguistic deficits). The P-type dyslexics learn to read using visual-perceptual strategies and continue to do so as they progress, whereas, the L-type dyslexics rely on linguistic-semantic or left hemisphere strategies. The L-type dyslexic learners demonstrate a pattern of visualspatial impairment, poor reading comprehension, and reliance on rote learning, similar to that of the NLD group.

There is support for the position that CNS impairment is tied to deficits both in learning and in socio-emotional functioning (Rourke & Fisk, 1981). Porter and Rourke (1985) delineated four separate socio-emotional subtypes of a mixed group of learning-disabled children through utilizing the clinical scales of the Personality Inventory for Children (Wirt et al., 1977). A subsequent study (Fuerst, Fisk, & Rourke, 1989) found support for the replication of three of these socio-emotional subtype groups broadly categorized as normal, emotionally disturbed, and hyperactive. Interestingly, the largest group in the Porter and Rourke (1985) study consisted of LD children who did not exhibit behavioral/emotional disturbances. The study supports the notion that the LD population is heterogeneous in terms of socio-emotional functioning and that there is not a unitary personality profile representative of such children. Although a large portion of learning-disabled children do not exhibit emotional disturbance, as Rourke (1989) notes, a significant portion demonstrate either marked psychological disturbance and internalized socio-emotional difficulties (26%), disproportionate somatic concerns (13%), or externalizing types of behavioral

disturbance such as overactivity, distractibility, insensitivity, and antisocial conduct (17%).

There is evidence for differences in emotional functioning between those individuals characterized as language deficient and those characterized as deficient in perceptual organization. Rourke and Finlayson (1978) characterized a group of children as being nonverbal perceptual-organization-output disabled (NPOOD). This group was defined as exhibiting a pattern of deficient arithmetic and visualspatial skills with relatively good reading and spelling (a forerunner of the NLD categorization). Ozols and Rourke (1985) found that children with NPOOD characteristics could not identify facial expressions and nonverbal gestures as well as language impaired children (verbal learning-disabled subtype). Strang and Rourke (1985) investigated the behavioral characteristics of a group of NPOOD children with the Personality Inventory for Children (Wirt et al., 1977) and compared them with two other subtypes of learning-disabled children, one with language based deficits. The NPOOD group obtained profile elevations on measures of psychosis, social skills, anxiety, withdrawal, and depression in comparison to nonsignificant findings of the other two groups. Rourke, Young, Strang and Russell (1985) found that depression and suicide attempts are more frequent among those categorized as NLD. From a developmental perspective, Rourke, Young, and Leenaars (1989) correlated suicidal behavior with NLD defined adolescents and adults and suggested that the risk for such behaviors increases as an individual matures. Finally, in a review of 300 journal articles and research reviews, Rourke and Fuerst (1996) concluded that the NLD pattern of central processing assets and deficits is the only LD pattern that appears to lead both to a particular pattern of academic achievement and an increased risk for significant psychopathology and tendency to develop an internalizing type of disorder.

Separate research has provided some support for a correlation between a specific pattern of learning deficiency and internalizing psychopathology. In an investigation of learning-disabled 13 year olds, White, Moffitt, and Silva (1992) found that only their specific-arithmetic disabled group exhibited a neuropsychological profile similar to that obtained for individuals with nonverbal learning disability as defined by Rourke (1989). Although poor socio-emotional adjustment was found among all learning-disabled groups in this study, the specific-arithmetic disabled subjects demonstrated the greatest degree of overlap between internalizing psychopathology and an NLD neuropsychological profile. It is of interest to the current research that the group most similar to the NLD profile appeared to be at greater risk for internalizing psychopathology.

The Role of Hormones

A more dynamic view of brain organization is presented by Kimura (1987). The behavior of men and women differ from each other in remarkable ways. Differences in body structure, parenting and reproductive behavior, problem-solving, communication, and cognitive style are illustrations. Kimura notes that men, in general, do better on certain spatial tests and on mathematical reasoning tests than do women. In contrast, women do better on articulation and verbal fluency tasks. While these disparities can be viewed as the result of differences in child rearing and education between males and females, Kimura contends that there is a hormonal contribution to their development.

In an exploration of the relationship between testosterone levels and cognitive ability patterns (Gouchie & Kimura, 1991), a nonlinear relationship between testosterone concentrations and spatial ability was found. Men with lower testosterone levels demonstrated superiority on spatial/mathematical tasks while women with high testosterone levels scored higher than low-testosterone women on the same measures. Scores on tests in which women generally outperform men,

and those which do not generally show a sex difference, were not found to be significantly related to testosterone concentrations. Other studies (Kimura & Hampson, 1994) support the idea of an optimum level of testosterone for spatial ability which is above the level of the average female but below that of the average male.

Sex hormones have impact on the brain prior to or just after birth and continue into adulthood (Kimura & Hampson, 1994). McEwen (1980), postulated that cognitive performance is influenced by sex hormones which impact brain activity through enzymes in brain regions which contain hormone receptors, the modification of uptake of neurotransmitters, and the moderation of fluctuations in neuronal electrical activity. There is evidence that cognitive skill may vary in relation to the menstrual cycle in women and with seasonal variations in men. Hampson (1990) found that women demonstrated relatively better performance on spatial tasks when in the low-estrogen stage of the menstrual cycle than when estrogen levels climax. Kimura and Hampson (1994) related male seasonal differences in performance on spatial tasks to variations in testerone levels in the autumn and spring. Men performed better on spatial tasks in the spring when testerone levels are higher.

Finally, with regard to brain lateralization research, there is the idea that androgens promote the growth of the right hemisphere and contribute to male superiority in certain spatial tasks. Following this line, Kimura (1987) explored the notion that nonverbal or spatial ability would be more right-hemisphere dependent in males than in females. In a review of male and female patients with unilateral damage to left or right hemispheres, Kimura found no differences in Performance IQ of the Wechsler Adult Intelligence Scale, a measure of nonverbal/spatial ability. She concluded that each subtest of the Wechsler Scale may tap different functions that are organized differently in the brain and that

classifying a test as "verbal" or "spatial" does not predict it's representation in the brain for men or women. She summarized that the greater nonverbal/spatial ability generally noted in men may be related to wider representation in the brain, or some difference in organization other than the idea of asymmetry.

In conclusion, there are many sources of variance between the sexes and among individuals, including genetic, biological, and environmental circumstances, which contribute to one's specific cognitive and affective abilities. Proficiency in any task can be viewed as a complex interaction among fluctuating factors and conditions.

Methodological Issues

Early investigations of children who present with either learning or emotional/behavioral problems have been justifiably criticized because of their failure to recognize the diverse nature of these groups. The majority of research on the academic and socio-emotional features of LD or emotionally troubled youngsters has been conducted with heterogeneous samples utilizing a contrasting groups approach which draws comparisons between normal children and those identified as impaired (Hooper & Willis, 1989). Such comparisons have limited benefit. In comparisons between normal children and those identified as either LD or emotionally impaired, the normals almost always demonstrate superior functioning on perceptual, psycholinguistic, cognitive, and social skill (Werry, 1986). This method obscures within-group differences and contributes little to identification of etiology or development of effective remediation techniques.

The conceptualization of learning disabilities as a heterogeneous classification, and the effort to derive reliable, homogeneous, learning disability subtypes within this classification, has allowed researchers to obtain clean, clear results regarding the strengths and weaknesses of specific subtypes of LD children. However, some prominent subtyping studies have serious methodological flaws in

that they lack appropriate comparison groups (e.g., Voeller, 1986; Weintraub & Mesulam, 1983). Internalized, externalized, and generalized types of psychopathology have been reliably identified in the general population (Achenbach, 1985). Consequently, the significance of the finding that such pathology is found among specific groups of LD children is difficult to assess if comparison groups are not utilized.

The high degree of selectivity of studies which require neurological evidence of hemispheric lesions or dysfunction (e.g., Voeller, 1996; Weintraub & Mesulam, 1983) makes the generalization of results to learning impaired and emotionally impaired individuals difficult. The Voeller subjects were selected from approximately 600 children referred for pediatric neurological evaluations, and the Weintraub subjects were selected consecutively over a period of four years. The Strang and Rourke study (1985) of the social-emotional characteristics of a specific LD subtype (nonverbal perceptual organization-output disability or NPOOD) addressed this problem by both providing a comparison group and identifying subtypes primarily on the basis of intelligence and achievement test results. The pattern of skills identified in the NPOOD group was consistent with that found in the Voeller (1986) and Weintraub and Mesulam (1983) studies making them similar groups to study without the requirement of identified lesion or brain dysfunction. Subsequent studies will need to utilize appropriate comparison groups and allow for the identification of subjects whose study will produce results which can have broad applicability.

The NLD subtype, elaborated on by Rourke and his colleagues (1989), is a relatively rare syndrome identified from a database of more than 5000 children referred for neuropsychological assessments, again raising the issue of a high degree of selectivity and thus limiting generalizability. Neuropsychological batteries are cost intensive, not readily available to most children, and are

infrequently utilized in either an education or child psychiatric setting. Such a high degree of selectivity was needed in the identification of the NLD subtype in pure form. However, subsequent research will need to address the identification of children who share characteristics with those with severe NLD but who meet less stringent inclusion criteria.

A major methodological issue involves the generalizability of laboratory tasks. While early studies of learning impaired children ignored socio-emotional functioning, current studies make inferences without investigating actual social skills. There is evidence that suggests that some learning disabled individuals may demonstrate age-appropriate performance on social-perception tasks in a lab setting, but fail to do so when in natural environments (Pearl, 1987). Similarly, a number of previous studies on nonverbal aspects of communication included a pictorial presentation of nonverbal emotional expression. However, research in the area of children's social problem solving (Vitaro & Pelletier, 1991) indicates that children respond differentially to videotaped presentations of provocations involving same-aged peers than they do to In Vivo provocations simulated by a peer confederate. It would be meaningful for additional studies to explore social interactions within naturalistic settings.

Most studies comparing LD and non LD groups have failed to assess the self-perceptions and cognitions of LD children (Semrud-Clikeman & Hynd, 1990). The socio-emotional skills of children are most frequently assessed on the basis of reports by significant adults such as parents, caretakers, or teachers. Few studies have included the child's self-report, despite indications that child report is often positive and parent report negative in the identification of both antisocial behaviors and internal emotional states (i.e., anxiety, depression, somatic concerns, peculiarities of thought) that may not be consistently represented in overt behavior (Lachar & Kline, 1992). Consequently, studies which include the self-report of

children would provide valuable information on their internal emotional states which is not available through traditional methods of observation and report of others.

Rational for Current Study

Problems in decoding facial affect, and other nonverbal communications can have damaging impact on the development of competence in interpersonal interactions. The accurate interpretation of facial expression has been positively correlated with peer social status (Spence, 1987), while poor decoding of facial affect has been associated with various emotional and behavior problems (Edwards, Manstead, & MacDonald, 1884; Walker, 1981). Some have concluded that social perception deficits are the most serious type of learning impairment (Minskoff, 1980) and that investigations of the socio-emotional correlates which accompany learning deficiencies have been insufficiently examined by researchers who have focused primarily on cognitive and academic skills (Hooper & Willis, 1989).

Many of the children who are referred for psychiatric evaluations are found to have impairments in learning in addition to emotional and behavior problems. It has been inferred, based on test data, that a specific pattern of cognitive skills and deficits is correlated with poor social skills and internalizing types of psychopathology (Rourke, Young, & Leenaars, 1989; White, Moffit, &Silva, 1992). It is assumed that visualspatial deficiencies interfere with the accurate decoding of emotion cues, which in turn disrupts the process of attachment to a caretaker and the formation of rewarding social relationships. However, there are relatively few studies examining the actual decoding of emotion cues and social interactions of children with differing patterns of cognitive skills. Since it has been demonstrated that children respond differently to videotaped peer provocations than they do to In Vivo provocations, it is imperative that new

research endeavors investigate more naturalistic settings when exploring the social and emotional skills of children.

There is a need for current research to examine the variances in social skills among groups of clinically referred children who are differentiated on the basis of differing patterns of cognitive skills. Few studies have investigated self-esteem, self-perceptions, and the ability of these children to accurately interpret emotion cues. It is important also to begin to investigate actual social interactions in realistic social situations. The current research explores these areas.

The Present Study

The interest in the present study was specifically on the social adaptive skills and emotional adjustment of children presenting with a general pattern of cognitive strengths and weaknesses similar to that of the NLD group. It has long been recognized that affective aspects contribute significantly to interpersonal communication and that affective sensitivity is important to the formation of adaptive patterns of social behavior (Johnson & Myklebust, 1967). The current research (1) evaluated and compared the perception and interpretation of nonverbally expressed emotions (e.g., facial expression) by children exhibiting a pattern of relatively stronger verbal skills, children exhibiting a pattern of relatively stronger visual-motor skills, and psychiatric controls exhibiting neither of these two patterns; and (2) investigated differences in peer interaction, social skill, and self-perception between the groups.

The second purpose of the study was to determine whether or not a pattern existed regarding the nature of the emotional disturbances evidenced by the children within these three groups. The literature review suggests that children with relatively weak visualspatial skills and poor nonverbal emotion decoding skills may be at greater risk for internalized types of psychopathology than those not so impaired and that this risk may increase with age.

Hypotheses

Hypothesis 1. Based on research which suggests that individuals with weak visualspatial skills also exhibit deficiencies in processing emotion conveyed through nonverbal channels of communication (McCauley et al., 1987; Rourke, 1989; Voeller, 1986) it was predicted that the group of clinically referred children with stronger verbal than visualspatial skills (NLD) would perform more poorly on measures of the interpretation of nonverbal gestures of emotion than would either those with stronger visualspatial (VLD) than verbal skills or the group of psychiatric controls.

Hypothesis 2. Based on research that has demonstrated that individuals who exhibit deficiencies in the accurate interpretation of nonverbal gestures of emotion tend also to exhibit relatively poorer social skills and to have lowered sociometric status (Edwards, Manstead & MacDonald, 1984; Feldman, White, and Lobato (1982), it was predicted that the NLD group would be rated by a parent or caretaker as less well adjusted socially, and would rate themselves as lower in self-esteem than either the VLD or the Control group.

Hypothesis 3. Based on research suggesting that children who exhibit a particular pattern of cognitive strength and weakness characteristic of the NLD syndrome (Rourke, 1989; White, Moffitt, & Silva, 1992) are at greater risk for internalized types of emotional problems such as depression/suicide, it was predicted that the NLD group in the present study would exhibit symptoms/diagnoses more characteristic of an internalizing type of pathology than would either the VLD or the Control group.

Hypothesis 4. It was expected that, due to the pervasive nature of a deficiency in the interpretation of nonverbal gestures of emotion (Johnson & Myklebust, 1971; Rourke, 1989; Semrud-Clikeman & Hynd, 1990), impairment in social interactions with peers would be apparent within a naturalistic setting.

Based on assertions by Strang and Rourke (1985) that children who exhibit NPOOD characteristics often tend to be overly talkative in social situations, not have close friends among children of their own age, and are reported by their parents to get along better with adults than with children, it was expected that the NLD group in the current study would interact more frequently with adults rather than children within a naturalistic setting. Similarly, due to the expectation that such children are deficient in the ability to obtain adequate and appropriate feedback from other children, and to give inappropriate messages, the children in the NLD group were expected to elicit negative feedback from other children. It was expected further that such children would tend to engage in more isolative or solitary activities than either the VLD or the Control group.

CHAPTER II

METHOD

Subjects

The majority of subjects were drawn from the group of male and female children, between the ages of 9 and 14, in treatment at one of two locations in Wayne County, Michigan: Hawthorn Center (H.C.), a children's psychiatric hospital; and Wolverine Human Services (WHS), a residential treatment program. Additional subjects were drawn from the Neurodevelopment department of the Windsor Regional Children's Center (WRCC) in Windsor, Ontario. Two of the facilities (Hawthorn and Wolverine) have large inpatient settings which allowed for the close observation of subjects and ready availability for participation in a research project.

Children who participated in the study were selected by the following means. In the first step, records of current patient psychology test report summaries were reviewed by either the author or by the head of the Language Clinic at Hawthorn Center (M.A., Reading Instruction; M.A., Learning Disabilities). Subjects were selected and assigned to groups on the basis of patterns of performance obtained on the WISC-R/WISC III (Wechsler; 1974, 1991),and WRAT-R (Jastak & Wilkinson, 1984). Each child evaluated in the H.C. or the WRCC program was administered a test battery which included both of these tests making such scores readily available. For children in the Wolverine program, this information was obtained from the patient clinical record.

The preliminary psychological evaluations were conducted by either a licensed psychologist or a graduate student research assistant under the supervision of a licensed psychologist. All children referred for evaluations at Hawthorn Center underwent a comprehensive psychological testing as part of the evaluation process. Psychological testing of the children in the Wolverine program was

conducted either in the public school setting or by a licensed psychologist under contract to the facility. Children from the WRCC program received neuropsychological evaluations at that facility. Approvals through the research committees of each program and through the Michigan Mental Health Board (TARC) regarding the use of inpatient records and subject involvement in a research project were obtained.

Three groups of 11 subjects each, ranging in age from nine to fourteen years were identified. Groups 1 and 2 were comprised of children who exhibited a pattern of relative strength in either verbal or visualspatial skills, (i.e., verbal-performance discrepancy of at least 12-points) respectively, whereas, Group 3 was made up of child psychiatric controls. Parameters for inclusion in each group followed in general accordance with well-substantiated learning disability subtype characteristics (Hooper & Willis, 1989; Rourke, 1991) and are described below:

NLD group:
WISC-R/WISC-III Full Scale IQ between 80 - 120
WISC-R/WISC-III Verbal IQ > Performance IQ (discrepancy ≥ 12 points)
WRAT-R Reading & Spelling scores > Arithmetic Score

VLD group:
WISC-R/WISC-III Full Scale IQ between 80 - 120
WISC-R/WISC-III Performance IQ > Verbal IQ (discrepancy ≥ 12 points)
WRAT-R Reading & Spelling scores < Arithmetic Score

Psychiatric Controls:
WISC-R/WISC-III Full Scale IQ (FSIQ) between 80 -120
WISC-R/WISC-III Verbal-Performance IQ discrepancy < 10 points
WRAT-R Reading, Spelling, & Arithmetic scores > 16th percentile

Those individuals with hearing impairment, uncorrected visual impairment, history of significant developmental disorder, neurological disease, or serious acquired brain trauma were excluded from this study. Similarly, non-native English speakers were not included.

Participants were drawn from those who were either currently involved in treatment with one of the three facilities or who had been evaluated within the previous two years. Of 248 cases reviewed for inclusion, 18 were found to fit the NLD criteria. Of these, 11 subjects agreed to participate in the study. Subjects were matched across groups on age, sex, and whenever possible, race.

All subjects participated in a one part assessment session which included measures of self-concept, socio-emotional functioning, and nonverbal receptive skills, e.g., response to differing facial expressions, gestures, postures, and In Vivo vocalizations. Assessments took place in a quiet room within the same facility with which the child had previous contact. Assessments were performed individually by the researcher. The parent/guardian of all subjects completed a personality inventory describing his/her child. A subset of children who resided in the Hawthorn Center program was observed by direct care staff in a naturalistic play activity and rated on interpersonal skills in an interaction with peers.

Table 2 summarizes the mean ages and the mean IQ and achievement scores for each of the three groups selected. Of the 33 children in the research project there were15 females and 18 males (5 females and 6 males in each group). Additionally, 23 were Caucasian and 10 were of African-American descent. Group comparisons (t-tests for independent samples) between African-American and Caucasian children on the DANVA receptive subtests indicated no significant differences ($p > .05$; see Table 3 for mean summary).

Measures and Materials

The Personality Inventory for Children/2 Research Edition (Wirt, Lachar, Klinedinst, & Seat, 1984; Lachar, 1990; Wirt, Lachar, Seat, & Broen, Jr., 1994). The Personality Inventory for Children (PIC) is a questionnaire inventory of up to 420 items that are answered "True" or "False" by a parent or parent surrogate. The revised version, PIC - R, provides the option of a booklet or computer presentation

Table 2

Means and Standard Deviations for Age, Verbal, and Performance IQs, Wide Range Achievement Test - Revised (WRAT-R) Reading, Spelling, and Artihmetic Scores by Group

	Group		
	NLD	VLD	CON
Age	12.40 (1.89)	12.37 (1.83)	12.42 (1.79)
VIQ	95.81 (9.25)	85.45 (12.80)	101.18 (9.87)
PIQ	78.0 (10.07)	105.3 (11.28)	103.0 (9.32)
Reading	96.45 (13.52)	71.81 (14.10)	99.81 (11.47)
Spelling	89.27 (14.14)	70.18 (10.98)	100.45 (10.53)
Arithmetic	65.63 (16.88)	98.0 (9.04)	100.81 (11.12)

Note. NLD = Nonverbal learning disability; VLD = Verbal learning disability; Con = Controls. Numbers in parentheses represent standard deviations.

Table 3

Mean Accuracy Scores for African American and Caucasian Children on the Diagnostic Analysis of Nonverbal Accuracy (DANVA) Receptive Subtests

DANVA Subtest	Group: African American n = 11	Group: Caucasian n = 23
Faces Adult (24 items)	18.40 (2.45)	18.08 (2.51)
Faces Child (24 items)	20.00 (1.56)	20.82 (2.77)
Postures (12 items)	7.80 (2.20)	8.13 (1.81)
Gestures (12 items)	8.20 (1.47)	8.26 (2.09)
Voices Adult (24 items)	15.70 (3.59)	15.82 (2.80)
Voices Child (16 items)	12.20 (2.70)	12.43 (2.79)
DANVA Total	82.60 (9.66)	83.56 (10.56)

Note. Numbers in parentheses are standard deviations.

and inventory lengths of 131-, 280-, or 420 items. The research version of the PIC (PIC/2) was utilized per agreement with David Lachar, Ph.D., one of the authors of the measure. This version included 280 items from the PIC - R and an additional 110 trial research items which were not a part of the current study. The 280 item format was utilized in the current investigation as it allows the scoring of the four factor scales, the Lie scale, and the Development scale, as well as shortened versions of the remaining 14 profile scales.

A comparison of intercorrelations between scores based on 420 items and scores calculated on the basis of the shorter revised version (280 items) was made using a large heterogeneous clinic sample (816 boys and 410 girls). Little difference was found in the relative size of the correlations between the original and the revised formats (Lachar, 1982). The scale can typically be completed by most parents within an hour or less. The PIC was created to provide comprehensive and clinically relevant descriptions of child behavior, affect, and cognitive status, as well as family characteristics, for children and adolescents ages 3 through 16 years. The measure is intended to identify various types of psychological dysfunction (e.g., depression, somatic concern, delinquency, social skills) on the basis of empirically derived observations. In addition to validity scales, the measure contains 12 clinical profile scales and 4 broadband factor scales for which elevations indicate various types of psychopathology or concern (scales are categorized in Table 4). Norms are provided by Wirt et al. (1984) and Lachar (1990). The PIC was utilized in the current study to define both the type and degree of psychopathology evidenced by the three groups of children in order to discern any particular patterns or differences between groups.

The reliability and validity of the PIC has been well established. Construct validity was provided in a relevant early study by Lachar et al. (1978) who correlated PIC clinical profile scales with the medical record of 79 psychiatric

Table 4

Personality Inventory for Children - Revised (PIC - R) Validity, Clinical, and Broadband Factor Scales by Category

Category	PIC - R Scale
Validity	Lie (L) Frequency (F) Defensiveness (DEF)
Screening	Adjustment (ADJ)
Clinical	
Cognitive functioning	Achievement (ACH) Intellectual Screening (IS) Development (DVL)
Externalizing behavior	Delinquency (DLQ) Hyperactivity (HPR)
Internalizing behavior	Somatic Concern (SOM) Depression (D) Withdrawal (WDL) Anxiety (ANX)
Family dysfunction	Family Relations (FAM)
Social ineptness	Psychosis (PSY) Social Skills (SSK)
Broadband Factor	Undisciplined/Poor Self-Control (I) Social Incompetence (II) Internalization/Somatic Complaints (III) Cognitive Development (IV)

outpatient children. These researchers found that the data obtained from the outpatient evaluations, on the average, correlated with 12 of the 16 profile scales. In another study, the PIC profiles of 839 children and adolescents were compared to DSM-III diagnoses, teacher and clinician ratings (Kline et al., 1988). A positive relationship was reported between PIC scales and the DSM-III diagnosis suggesting that there was a degree of convergent validity. Additionally, high correlations were found between PIC profiles, teacher ratings and clinician ratings, indicating high concurrent validity. Finally, in an analysis of the demographic variables of 1333 children whose mothers completed the PIC (Kline & Lachar, 1992), results indicated no effects of child gender, ethnicity, or pattern of interaction on the scores, suggesting that the PIC is potentially unbiased with respect to ethnicity or gender. Although age related differences were found, they are controlled for through the use of separate age norms in the interpretation of the test. Evidence of high internal consistency and high test- retest reliability was also found.

The Personality Inventory for Youth - Research Version (Lachar & Gruber, 1994). The Personality Inventory for Youth (PIY) is a self-report questionnaire inventory that parallels the parent-completed PIC. The target age range of the PIY is from 9- to 18- years. Items are maintained in the true-false format and have been judged to be at an instructional reading grade level of 3.4. The majority of the 270 items of the PIY were translated into the first person format from the PIC while other items were revised to maintain their original general meaning. The PIY was created to provide a multi-source assessment, eliminating the need to rely on the report of a single informant. The measure contains 4 validity scales, an intellectual screening scale, and nine clinical scales reduced by merger of three PIC cognitive scales into one and by combining the PIC measurements of depression and anxiety into a single PIY scale that represents these two

internalizing dimensions (Lachar & Gruber, 1995). Table 5 lists PIY scales by category. Table 6 presents PIY clinical scales and their corresponding subscales.

Relibility and validity data for the Personality Inventory for Youth are reported in the PIY technical manual (Lachar & Gruber, 1995). Content validity was demonstrated through high correlations between the items on the PIY and the PIC-R, and satisfactory internal consistency. Criterion validity was demonstrated through correlations with a variety of clinical instruments and the PIC-R, and medical record symptom dimensions (correlations ranged from $\underline{r} = .21$ to $\underline{r} = .70$, with most correlations in the moderate to high range). Finally, construct validity was demonstrated through gender and ethnic comparisons.

The self-report of a child often varies from that of the parent in areas such as antisocial behavior engaged in outside the home and in assessing internal emotional states (Lachar & Kline, 1992). The self-report format of the PIY was utilized to provide additional data in the identification of internal emotional states.

The Diagnostic Analysis of Nonverbal Accuracy (DANVA) Scale (Nowicki & Duke, 1989, 1994). The DANVA was designed to measure individual differences in the accurate sending and receiving of nonverbal social information. The DANVA consists of two scales: one representing a measure of nonverbal receptive abilities, the other a measure of nonverbal expressive abilities. The test is designed to be administered either individually or in groups. The scale includes four receptive and four expressive subtests. The receptive subtests are described below.

Faces 2: Adult and Child. In this subtest photographs of 24 adult and 24 child facial expressions are presented to the subject for an interval of approximately 1 and no more than 5 seconds before the photo is removed. Photographs representing four emotions are depicted; happy, sad, angry, and fearful. For both the adult and child faces there are equal numbers of facial

Table 5

Personality Inventory for Youth (PIY) Validity, Screening, and Clinical Scales by Category

Category	PIY Scale
Validity	Validity (VAL) Inconsistency (INC) Dissimulation (FB) Defensiveness (DEF)
Screening	Classroom Screening (CLASS)
Clinical	
Cognitive functioning	Cognitive Impairment (COG)
Externalizing behavior	Delinquency (DLQ) Impulsivity and Distractibility (ADH)
Internalizing behavior	Somatic Concern (SOM) Psychological Discomfort (DIS) Social Withdrawal (WDL)
Family dysfunction	Family Dysfunction (FAM)
Social ineptness	Reality Distortion (RLT) Social Skills Deficits (SSK)

Table 6

Personality Inventory for Youth (PIY) Clinical Scales and Corresponding Subscales

PIY Clinical Scale	PIY Subscale
Cognitive Impairment (COG)	Poor Achievement and Memory (COG1) Inadequate Abilities (COG2) Learning Problems (COG3).
Impulsivity/Distractibility (ADH)	Brashness (ADH1) Distractibility/Overactivity (ADH2) Impulsivity (ADH3)
Delinquency (DLQ)	Antisocial Behavior (DLQ1) Dyscontrol (DLQ2) Noncompliance (DLQ3)
Family Dysfunction (FAM)	Parent-Child Conflict (FAM1) Parent Maladjustment (FAM2) Marital Discord (FAM 3)
Reality Distortion (RLT)	Feelings of Alienation (RLT1) Hallucinations and Delusions (RLT2)
Somatic Concern (SOM)	Psychosomatic Syndrome (SOM1) Muscular Tension and Anxiety (SOM2) Preoccupation with Disease (SOM3)
Psychological Discomfort (DIS)	Fear and Worry (DIS1) Depression (DIS2) Sleep Disturbance (DIS3)
Social Withdrawal (WDL)	Social Introversion (WDL1) Isolation (WDL2)
Social Skills Deficits (SSK)	Limited Peer Status (SSK1) Conflict with Peers (SSK2)

expressions of low, middle, and high levels of affective intensity represented. The DANVA Faces 2 test was developed from the original Faces test but varies the facial expression intensity to allow for both the identification of affect processing problems and the levels of affect intensity at which the processing problems occur. Subject scores range from 0 to 24 for both the adult and child expressions.

Reliability and validity information for the DANVA Faces 2 is provided by Nowicki and Carton (1993). Significant correlations ($p < .05$) between DANVA Faces 2 and adult facial expressions in the original DANVA emerged (college students, $r = .54$; fifth-grade students, $r = .48$; third-grade students, $r = .41$; first grade students, $r = .44$). Significant correlations also emerged with the DANVA Faces 2 and child facial expressions of the DANVA (college students, $r = .44$; fifth-grade students, $r = .57$; third-grade students, $r = .55$; first grade students, $r = .54$). Higher scores on the DANVA Faces 2 were found to be related to higher achievement test scores for second-grade students ($r = .44$) providing additional construct validity. Test-retest reliabilities over a 2-month period for the DANVA Faces 2 for adult stimuli were .84 for college students and .74 for third-grade students. For the DANVA Faces 2 child stimuli, test reliabilities were .88 for college students and .79 for third-graders.

Postures. In this subtest subjects are presented with 12 photographs of a model displaying various types of body postures while facial expressions are hidden. The four emotions: happy, sad, angry, and fearful are represented by three photographs each. Scores range from 0 to 12. Photos are presented at approximately one second exposures.

Gestures. In this subtest a model is depicted displaying gestures representing the emotions of happy, sad, angry, and fearful. Again, facial expression is hidden. Twelve photos are presented at one second exposures.

Paralanguage: Adult and Child. In the first part of this subtest an audiotape of adult voices repeats the same sentence 24 times. The sentence "I am going out of the room now and I'll be back later" is executed in a tone of voice to reflect one of the four emotions of happy, sad, angry, and fearful. The sentence is repeated 24 times and scores on this subtest range from 0 to 24. The loudness is varied and is part of the information regarding the emotion being conveyed. Following the audiotape of adult voices, an audiotape of child voices is played in which the same sentence is repeated 16 times. Again the loudness may vary with each trial as part of the information regarding the emotion being conveyed.

The facial expressions, postures, gestures, and vocalizations utilized on the DANVA received 80% or greater agreement when rated by groups of adults, adolescents, elementary, and preschool aged children. Nowicki and Duke (1989) provide support for construct validity and test-retest reliability of the DANVA . Supporting the construct validity of the DANVA was the finding that nonverbal social processing improves with age, and is related to peer popularity and emotional disturbance. In a measure of test-retest reliability, 1001 children were tested at four week intervals. For the facial expression, gesture, posture, and paralanguage receptive subtests, the coefficients of reliability were .84, .86, .77, and .74, respectively. For the facial expression, gesture, and paralanguage expressive subtests, the coefficients of reliability were .80, .72, and .70, respectively. In addition, Nowicki and Duke (1994) report on fourteen subsequent studies which provide further evidence of construct validity for the DANVA. General conclusions were that accuracy on DANVA subtests improved with age, scores were internally consistent and reliable over time, and accuracy was significantly related to measures of emotional adjustment and academic achievement.

The Piers-Harris Children's Self-Concept (PHCSCS) Scale (Piers & Harris, 1969, 1984). The Piers-Harris scale, unlike many other measures of self-concept, is based on the child's own perceptions rather than the observations of parents or teachers. The scale, subtitled "The Way I Feel About Myself," assesses self-concept in individuals 8- to 18- years of age. The scale is intended for use for children in grades 4 through 12 and can be administered either individually or in a group. It is composed of 80 items covering six subscales: Physical Appearance and Attributes, Anxiety, Intellectual and School Status, Behavior, Happiness and Satisfaction, and Popularity. Items are simple descriptive statements, written at a third-grade reading level. Children indicate whether each item applies to them by selecting a "yes" or "no" response. Summary scores give an overall measure of self-concept, while subscale scores permit more detailed interpretation. Raw scores (total number of responses marked in the positive direction) can be converted to percentiles, stanines, and T-scores. The entire scale can be administered and hand scored in approximately 20 minutes. Scoring can also be completed with mail-in answer sheets or microcomputer disk. The Piers-Harris was normed in the 1960's on 1,183 children in grades 4 through 12. Epstein (1985) reports that recent reliability studies generally confirm and expand on the results of the original studies. Test-retest reliabilities ranged from .42 to .96, with a mean of .73. Studies investigating internal consistency yielded coefficients ranging from .88 to .93 on the total scale. In another study using the scores from the original norm group, the internal consistency coefficient for the total scale was .90, with the cluster scales ranging from .73 to .81. Thus, the instrument appears to be highly reliable in terms of temporal stability and internal consistency. The revised Piers-Harris manual (1984) describes recent validity studies and provides tables summarizing results.

The Direct Behavioral Assessment of Peer Interaction (Michelson & Dilorenzo, 1981). The direct behavior observation method, developed for use by residential staff in a psychiatric environment, involves the observation of children within a free-play setting. Michelson and Dilorenzo adapted the method from existing scales to increase reliability and improve upon existing observational techniques used to assess peer social interactions. The general format detailed by Michelson and Dilorenzo was utilized and is described below.

Staff members were instructed to choose six activities before a group of children entered a free-play room (two from each of the following categories: Board games, e.g., checkers, monopoly; manipulative games, e.g., puzzles, wooden blocks; and sensory-motor games). Games were changed daily so as to avoid boredom. Activities were chosen to provide children a choice of solitary play or group interaction. Staff members were asked not to initiate play or direct the children in any way except when a child's interactions were assaultive or extremely provocative in nature.

The definitions of peer interactions adapted by Michelson and Dilorenzo for the behavioral assessment of peer interaction were utilized in the current study and are delineated in Appendix C. Observers were given two 30-minute training sessions during which descriptions of four peer interactions were explained (adaptive peer interaction, maladaptive peer interaction, solitary independent play, and response to staff), questions answered, and trial observations completed. Interrater reliability was calculated between two raters at a time.

In the current study, observations were made from an adjacent room through a one-way mirror and with an intercom system built into the two rooms and used by raters to listen to ongoing activities and conversations. Raters (child care workers) used a pre-recorded audiotape that signaled the beginning and end of each observation interval. After 1 minute elapsed, the observers rated the second

child on the list and rotated their observations until all children were rated for a total of 4 minutes. The order of rating the children changed at each observation period and was counterbalanced to control for order effects. Responses were recorded on a prepared coding sheet (see Appendix D).

The direct behavioral assessment of peer interaction provided objective information in an actual social situation. In their study, Michelson and Dilorenzo (1981) found overall interrater reliability between primary and secondary observers to be good (94.3%). The interrater reliability coefficients for the four behaviors observed (adaptive peer interaction, maladaptive peer interaction, solitary-independent play, and response to staff) were as follows: 95.4%, 94.0%, 92.7%, and 93.4%, respectively.

Fifteen individuals included in the study who resided at Hawthorn Center were observed on 8 occasions during a structured free-play activity by two child care staff members. The staff members were blind to the assumptions of the study and were trained in the use of the direct observation technique. Interrater reliability for the classification of responses was calculated using the formula: Number of Agreements between judges divided by the Sum of the Number of Agreements and Disagreements. Cohen's Kappa was used to correct for chance agreements.

Procedure

Children in the three study groups were identified by either the investigator or the language clinic department head of the Hawthorn Center school. Psychological/Neuropsychological test summaries of all subjects receiving treatment in the three facilities were reviewed in the initial screening of prospective subjects. For the subjects identified in the Hawthorn Center and Wolverine programs, parents of children who fit the Nonverbal learning disability pattern were contacted by a facility social worker who explained the project and

obtained parental consent. The remaining two groups (Verbal learning disability and Control) were matched on the basis of age, sex, and race to the NLD group. When matches were identified consent was obtained from parents using the above described process. Once parental permission was received, the subjects met individually with the experimenter who described the project and obtained the child's assent. For subjects identified from the Windsor Regional Children's Center a mailing was sent describing the project and phone contact by the experimenter was made approximately one week later. If the parent and child agreed to participate, an appointment was made and consent was signed at the time of the testing (see Appendix E).

For those children whose parent(s) gave consent, a parent was given the Personality Inventory for Children-Revised questionnaire to complete (see Appendix F for instructions). All parents completed the inventory either in a separate room while their child was taking part in the project or in the office of the child's assigned social worker during a regularly scheduled progress meeting.

All subjects in the three groups were tested on an individual basis in a quiet office setting. All measures, with the exception of the direct observation component, were administered by the researcher. The testing took between one and two hours to complete for each child. The following order of test administration was utilized for all children: (1) PHCSCS; (2) DANVA; (3) PIY. Prior to beginning, each subject was given the opportunity to accept or decline the invitation to participate.

Fifteen children from the Hawthorn Center program also took part in the direct observation component of the project (2 females and 3 males from each group). Eight child care staff members were trained by the experimenter during two, one hour training sessions in the direct observation technique. During the first session the procedure was explained, the behaviors to be observed defined,

and the rating system described. The raters also listened to the audiotape which was used to regulate the schedule of observations and recordings and to ask any questions. During the second session, raters were taken to the observation room and given the opportunity to practice using the audiotape to make observations and record the behavior of a small group of children not involved in the project. Following the practice all raters were again given the opportunity to ask questions concerning procedures. Three child care staff persons were involved in observations at any one time. Two served as raters while the third supervised the children's play during the activity. All raters were blind to the premises of the study.

The Piers-Harris Children's Self-Concept Scale. The experimenter began by explaining to the subjects that she was interested in finding out "how children think and feel about themselves, and how they can tell what other people are feeling." Children were then given a set of descriptive statements and asked to circle the word "yes" if the statement was true or mostly true about them, and "no" if the statement was false or mostly not true about them. Each child was asked to read the first few statements aloud to determine any difficulty with reading or reading comprehension ability. If any hesitancy was noted in reading ability, the statements were read to the subject by the experimenter (necessary for only one child). A total score for the 80-item set was tallied as were scores on the six subscales. The instructions for the PHCSCS and subscale titles are included in Appendix G.

The DANVA subtests. The four receptive tests of the DANVA were presented to each child individually. The order of the subtests was: facial expressions (adult, then child expressions), postures, gestures, and paralanguage (adult, then child voices). Instructions to subjects for each subtest are included in

Appendix H. Responses were recorded by the experimenter on a separate answer sheet.

The Personality Inventory for Youth- Research Version (PIY). The 270 items of the PIY were administered orally to each child to control for differences in reading ability among subjects. Children were first read the general instructions for the PIY, which are included in Appendix I, and allowed to ask any questions. Subjects were given a numbered answer sheet on which they were instructed to darken the "T" if the descriptive statement being read was true about them or the "F" if the statement was false.

The Direct Behavior Assessment of Peer Interaction. Children participating in this portion of the project were observed in a playroom setting by trained raters on 8 separate occasions for 30 to 40 minute periods of time. The playroom was a pleasant carpeted room (15 x 20) with a game table, couch, and comfortable chairs. A large mirrored observation window with one-way glass (5 x 4) gave observers an unobstructed view of the children at play. A built in microphone allowed observers in the adjoining room to hear conversation clearly. The observation room contained a ledge for writing and 4 stools for observers. Observers began ratings approximately one minute after children entered the room. When ready to begin, one rater started an audiotape which regulated a 10-second observe, 5-second record schedule. A female voice instructed raters with the words "observe" and "record." Inflection went up at the end of the word "observe" and down with the word "record." Observers categorized behavior with a check in one of 4 possible columns on a recording sheet; Adaptive Peer Interaction (API), Maladaptive Peer Interaction (MPI), Solitary Independent Play (SIP), and Response to Staff (RSI). The order of observation was changed at each observation period to control for order effects. Two observers were used at all

times and an interrater reliability check was performed by having a second rater observe and rate each child.

Prior to each observation session, a child care staff member chose six activities which were in place before children entered the free-play room. Two items from each of the following categories were chosen: board games, manipulative games, and sensory-motor games. The items were placed in three labelled boxes in an accessible closet for staff to choose from. Items included card and table games, dolls, action figures, legos, puzzles, art supplies, records, etc. Items were rotated daily so as to maintain interest. Subjects were told that the investigator was interested in how children like to play. Subjects were aware that their play may sometimes be observed through the one-way mirror. In general, subjects paid no attention to the mirror and did not appear in any way distracted by the possibility of being observed.

Analyses

The design of the study consists of a factorial combination of group (NLD, VLD, Controls) and task (Piers-Harris subscales, DANVA subtests, PIC scales, PIY scales, and direct behavior ratings). Data were analysed using Statistical Procedures for Social Sciences (SPSS Inc., 1994).

Hypothesis 1. One-Way Analyses of Variance (ANOVAs) were used to test the hypothesis that the accuracy for decoding nonverbal information would be better for VLD and control group children than for the NLD group (Huberty & Morris, 1989). The dependent variables were the total scores on each DANVA subtest. Additionally, to examine the status (adult vs child) and modality (visualspatial vs auditory) effect of the stimulus presented, a 3 (group) x 2 (status) x 2 (modality) repeated measures Analysis of Variance was used. Finally, a 3 (group) x 4 (emotion) repeated measures Analysis of Variance was performed for

each DANVA subtest with the dependent variables being the percentage of correct responses for each emotion depicted (happiness, sadness, anger, fear).

Hypotheses 2 and 3. Both MANOVAs and One-Way ANOVAs were used to test the hypothesis that the NLD group would be rated by parents and themselves as less well adjusted socially, lower in self-esteem, and as demonstrating relatively more internalizing types of psychopathology than either the VLD or the control group. Scores obtained on the Piers-Harris self-esteem measure, the Personality Inventory for Children - Revised, and the Personality Inventory for Youth were used as dependent variables. Chi-square analysis was used to test the hypothesis that the NLD group would receive psychiatric diagnoses more characteristic of an internalizing type of pathology than either the VLD or the Control group.

Hypothesis 4. One-way ANOVAs were used to examine the within and between group variances in a free-play setting to test the hypothesis that the NLD children would exhibit more impairment is social interactions than either the VLD or the control group. The behavior observation rating scores obtained using the direct behavioral observation method were used as the the dependent measure.

CHAPTER III

RESULTS

Hypothesis 1

It was predicted that children with NLD would be less accurate at decoding nonverbal information, particularly that presented in a visualspatial modality, than would children with verbal learning deficiencies or psychiatric controls without learning impairment. To examine this prediction, the responses that subjects gave on a measure of nonverbal accuracy (DANVA) were considered.

To test the hypothesis that receptive decoding accuracy on the DANVA would be better for VLD children and control group children, a one-way Analysis of Variance (ANOVA) was performed for each of the DANVA subtests (Huberty & Morris, 1989). The six dependent variables used in the analysis were the total scores obtained on the adult faces, child faces, postures, gestures, adult voices, and child voices subtests. The independent variable was group (NLD, VLD, control). Unless otherwise indicated, differences in means were examined using the Bonferroni test (SPSS, 1994). ANOVA tables are included in Appendix J.

The Analysis of Variance for the adult faces variable emerged significant, F (2, 30) = 3.85, $p < .05$. Subsequent mean comparisons revealed that the NLD group children identified significantly fewer adult facial expressions (16.63) than did control group children (19.09) but not children with VLD (18.82). The latter two groups did not differ significantly from each other. Mean accuracy scores for DANVA receptive subtests are summarized in Table 7. Similarly, the Analysis of Variance for the gestures variable was significant, F (2, 30) = 4.30, $p < .05$. Mean comparisons using the Bonferroni test revealed that the NLD group children identified significantly fewer gestures (7.0) than control group children (9.0) but not than VLD group children (8.72). Mean comparisons for the remaining

Table 7

Mean Accuracy Scores on Diagnostic Analysis of Nonverbal Accuracy (DANVA) Receptive Subtests by Group

DANVA Subtests	Group NLD n = 11	VLD n = 11	Control n = 11	F (2,30)
Adult Faces (24 items)	16.64[a] (2.80)	18.82[ab] (2.18)	19.09[b] (1.70)	3.85*
Child Faces (24 items)	19.27 (2.61)	20.91 (1.51)	21.55 (2.73)	2.73
Postures (12 items)	8.00 (1.94)	8.00 (2.23)	8.09 (1.70)	.00
Gestures (12 items)	7.00[a] (1.73)	8.72[ab] (1.61)	9.00[b] (1.84)	4.30*
Adult Voices (24 items)	14.27 (2.90)	16.55 (2.70)	16.55 (3.08)	2.26
Child Voices (16 items)	12.36 (3.29)	12.09 (2.26)	12.64 (2.77)	.10

Note. Numbers in parentheses are standard deviations. Means with the same superscript are not significantly different.

*$p < .05$.

variables did not reach significance but were generally in the expected direction with the NLD group demonstrating less accuracy than either the VLD or the control group.

Further to the above calculations, analyses were also performed to examine group (NLD, VLD, control) and within subject differences related to the status (adult vs child) and modality (visualspatial vs auditory) of the stimulus presented. A 3 (group) x 2 (status) x 2 (modality) Analysis of Variance was performed with repeated measures on the last two factors. The scores on the DANVA receptive subtests: Adult Faces 2, Child Faces 2, Adult Voices, and Child Voices were used in the analysis. The results of these analyses are described below and summarized in Appendix J, Table J1.

Results of this analysis revealed a significant effect for status, $\underline{F}$ (1, 30) = 189.45, $\underline{p} < .0001$ with children producing a statistically higher rate of accurate responses when judging child models than when judging adult models. This effect was moderated by a significant Status x Modality interaction, $\underline{F}$ (1, 30) = 86.82, $\underline{p} < .0001$. Children were most accurate in interpreting visual spatial stimuli modeled by children; least accurate in interpreting auditory stimuli modeled by adults. Results for the group effect, the Group x Status interaction, the Group x Modality interaction, and the Group x Status x Modality interaction did not emerge significant ($\underline{p} > .05$) .

While the effect for group did not emerge significant the results were in the expected direction. NLD children performed with less accuracy (75%) than either VLD (83%) or control group children (85%) when stimuli were presented in a visualspatial modality (see Table 8 for mean accuracy scores). Similarly, NLD children performed with less accuracy (68%) than either VLD (72%) or control group children (74%) when stimuli were presented in an auditory channel.

Table 8

Mean Accuracy Scores on the Diagnostic Analysis of Nonverbal Accuracy (DANVA) Receptive Subtests for Adult Faces, Child Faces, Adult Listening, and Child Listening Tests

	Group		
	NLD	VLD	Control
DANVA Subtest	n = 11	n = 11	n = 11
Faces Adult (24 items)	16.64 (2.80)	18.82 (2.18)	19.09 (1.70)
Faces Child (24 items)	19.27 (2.61)	20.91 (1.51)	21.55 (2.73)
Voices Adult (24 items)	14.27 (2.90)	16.55 (2.70)	16.55 (3.08)
Voices Child (16 items)	12.36 (3.29)	12.09 (2.26)	12.64 (2.77)

Note. Numbers in parentheses are standard deviations.

The greatest difference in accuracy between groups was noted when children were presented with adult visualspatial stimuli with NLD children performing with less accuracy (69%) than VLD children (78%) and control group children (80%).

To summarize, results of the one-way Analyses of Variance examining the six receptive DANVA subtests emerged significant for the adult faces and gestures variables. The remaining variables did not emerge significant. However, means were generally in the expected direction with NLD group children demonstrating less accuracy than either the VLD or the control group.

Significant effects emerged in the analysis examining the status and modality of the stimulus presented. Children produced a statistically higher rate of accurate responses when a child stimulus was offered than when the stimulus was that of an adult. The lowest rate of accuracy occurred when stimuli were presented through an auditory channel by an adult while the highest rate of accuracy was obtained when stimuli were presented in a visualspatial channel by a child. Although the effect for modality was not significant, children produced a higher overall rate of accurate responses when stimuli were presented in a visualspatial modality than when the stimuli were presented through an auditory channel.

While group differences did not emerge significant when examining the status and modality of the stimulus presented, results were in the expected direction with NLD children performing less accurately than either VLD or control group children when stimuli were presented in a visualspatial channel and when presented in an auditory channel. NLD children performed least well in group comparisons when presented with adult visualspatial stimuli.

In addition to the above calculations, analyses were also performed to examine group (NLD, VLD, control) and within subject differences related to the 4 emotions on the DANVA receptive subtests. For the sum of correctly identified emotions on each DANVA subtest a 3 (group) x 4 (emotion) Analysis of Variance

was performed with repeated measures on the last factor. The results of these analyses are summarized below.

Adult Faces Subtest. Results of this analysis, summarized in Appendix J, Table J2, revealed a significant effect for group, F (2, 30) = 3.95, $p < .05$, and for emotion, F (3, 90) = 13.84, $p < .0001$. The Group x Emotion interaction did not emerge significant. Mean comparisons indicated that the NLD group was significantly less accurate in identifying adult facial emotion (70%) in comparison to both the VLD (79.5%) and the control group (79.5%) which did not differ from each other. The NLD group obtained a lower accuracy rate identifying all four emotions than did either the VLD or the control group, but this trend was not significant. All participants identified happy (85%) and sad (87%) adult facial expressions with significantly greater accuracy than angry (70%) and fearful (62%) expressions (see Table 9 for means summary).

Child Faces Subtest. Results of this analysis, summarized in Appendix J, Table J3, revealed a significant effect for emotion, F (3, 90) = 10.93, $p < .0001$. The effect for group and the Emotion x Group interaction did not emerge significant. Children identified happy (95%) and sad (92%) child facial expressions with significantly greater accuracy than either the angry (74%) or the fearful (80%) expressions. Although significant group differences were not found, NLD children accurately identified fewer child facial expressions (80%) than either the VLD (87%) or the control group (89%). Mean accuracy rates for child facial expressions are presented in Table 10.

Postures. Results of this analysis, summarized in Appendix J, Table J4, revealed a significant effect for emotion, F (3, 90) = 6.62, $p < .0001$. The group effect and the Emotion x Group interaction did not emerge significant. Mean comparison indicated that children identified sad postures with a significantly greater degree of accuracy (84%) than either fearful (69%), happy (60%), or angry

Table 9

Mean Accuracy Scores on the Diagnostic Analysis of Nonverbal Accuracy (DANVA) Receptive Adult Faces Subtest Generated by Group

Emotion	Group		
	NLD n = 11	VLD n = 11	Control n = 11
Happy (5 items)	4.18 (0.75)	4.36 (0.50)	4.27 (0.64)
Sad (6 items)	4.54 (1.36)	5.90 (0.94)	5.27 (1.19)
Angry (7 items)	4.54 (1.44)	4.81 (0.98)	5.45 (0.93)
Fearful (6 items)	3.27 (1.73)	3.81 (0.90)	4.00 (1.00)

Note. Numbers in parentheses are standard deviations.

Table 10

Mean Accuracy Scores on the Diagnostic Analysis of Nonverbal Accuracy (DANVA) Receptive Child Faces Subtest Generated by Group

Emotion	Group NLD n = 11	VLD n = 11	Control n = 11
Happy (6 items)	5.54 (0.93)	5.72 (0.46)	5.90 (0.30)
Sad (6 items)	5.36 (0.67)	5.63 (0.67)	5.72 (0.46)
Angry (6 items)	3.81 (2.13)	4.72 (0.90)	4.81 (1.66)
Fearful (6 items)	4.54 (1.21)	4.81 (1.07)	5.09 (1.04)

Note. Numbers in parentheses are standard deviations.

(54%) postures. Children in all three groups were very similar in overall accuracy rates of correctly identified emotion with the NLD group achieving a 66% accuracy rate, the VLD group a 66.5% rate and the control group a 67% rate. Mean accuracy rates for postures are presented in Table 11.

Gestures. Results of this analysis, summarized in Appendix J, Table J5, revealed a significant effect for group, F (2, 30) = 4.30, $p < .05$, and for emotion, F (3, 90) = 94.69, $P < .0001$. The Group x Emotion interaction did not emerge significant. Mean comparisons indicated that the NLD group produced a significantly lower rate of accuracy in identifying emotion conveyed through gestures (64%) than either the VLD (76%) or the control group (77%), which did not differ from each other. Mean accuracy rates for the Gestures subtest are described in Table 12. The performance of NLD children was in the expected direction of reduced accuracy for the happy (52%), angry (62%), and fearful (41%) gestures when compared to the VLD group (73%, 71%, 68% respectively) and the group of controls (66%, 80%, 73% respectively). Mean comparisons indicated that children identified sad gestures with a significantly greater degree of accuracy (93%) than either angry (71%), happy (64%), or fearful (61%) gestures.

Adult Voices. Results of this analysis, summarized in Appendix J, Table J6, revealed a significant effect for emotion, F (3, 90) = 5.62, $p < .001$. The group effect and the Emotion x Group interaction did not emerge significant. Mean comparisons revealed that children identified angry adult voices with significantly greater accuracy (79%) than either sad (64%), happy (62%), or fearful (59%) voices. Group means were in the expected direction with the NLD group attaining a lower overall rate of accuracy (60%) in identifying emotions conveyed through an adult voice than either the VLD (69%) or control group (69%) children. The latter two groups were not statistically different (see Table 13 for means).

Table 11

Mean Accuracy Scores on the Diagnostic Analysis of Nonverbal Accuracy (DANVA) Receptive Postures Subtest Generated by Group

Emotion	Group		
	NLD n = 11	VLD n = 11	Control n = 11
Happy (3 items)	1.81 (0.98)	1.90 (0.83)	1.72 (0.46)
Sad (3 items)	2.63 (0.50)	2.27 (0.90)	2.63 (0.67)
Angry (3 items)	1.72 (0.90)	1.54 (0.82)	1.63 (1.02)
Fearful (3 items)	1.81 (1.07)	2.27 (1.09)	2.09 (1.13)

Note. Numbers in parentheses are standard deviations.

Table 12

Mean Accuracy Scores on the Diagnostic Analysis of Nonverbal Accuracy (DANVA) Receptive Gestures Subtest Generated by Group

Emotion	Group		
	NLD n = 11	VLD n = 11	Control n = 11
Happy (4 items)	2.09 (0.53)	2.90 (0.83)	2.63 (1.02)
Sad (1 item)	1.00 (0.00)	.90 (0.30)	.90 (0.30)
Angry (5 items)	3.09 (1.22)	3.54 (1.03)	4.00 (0.89)
Fearful (2 items)	.81 (0.75)	1.36 (0.67)	1.45 (0.52)

Note. Numbers in parentheses are standard deviations.

Table 13

Mean Accuracy Scores on the Diagnostic Analysis of Nonverbal Accuracy (DANVA) Receptive Adult Voices Subtest Generated by Group

Emotion	Group		
	NLD n = 11	VLD n = 11	Control n = 11
Happy (6 items)	3.09 (1.70)	4.09 (1.44)	4.00 (1.59)
Sad (6 items)	3.36 (1.43)	4.18 (1.44)	3.90 (1.59)
Angry (6 items)	4.63 (1.02)	4.81 (0.98)	4.72 (1.19)
Fearful (6 items)	3.18 (1.88)	3.45 (1.57)	3.90 (1.04)

Note. Numbers in parentheses are standard deviations.

Child Voices. Results of this analysis, summarized in Appendix J, Table J7, revealed a significant effect for emotion, F (3, 90) = 19.14, $p < .0001$. The group effect and the Emotion x Group interaction did not emerge significant. Children identified sad child voices with significantly greater accuracy (70%) than either angry (49%), happy (46%), or fearful (41%) voices. Children in all three groups were similar in overall accuracy rates of correctly identified emotion conveyed by a child voice with the NLD group achieving a 52% accuracy rate, the VLD group a 50% rate and the control group a 53% rate (see Table 14 for means).

Intensity of Stimuli. Finally, analyses were performed examining DANVA errors related to the intensity of the stimuli presented (high vs low level). A one-way Analysis of Variance (ANOVA) was performed for errors obtained at both high and low level intensity of stimuli on the Adult Faces, Child Faces, and Adult Voices subtests. The six dependent variables used in the analyses were the total errors obtained on low intensity adult faces, high intensity adult faces, low intensity child faces, high intensity child faces, low intensity child voices, and high intensity child voices. The independent variable was group (NLD, VLD, control).

The Analysis of Variance for errors obtained with low intensity stimuli on the adult faces variable emerged significant, F (2, 30) = 3.39, $p < .05$. Subsequent mean comparisons using the Bonferroni test revealed that the NLD group children made significantly more errors when presented with low intensity adult facial expressions (4.09) than did control group children (2.72) but not children with VLD (3.54). Mean error scores for DANVA receptive subtests at high and low intensity and one-way analyses for the dependent variables are summarized in Table 15. Mean comparisons for the remaining variables did not reach significance. A description of the incorrect emotions which participants identified (affect of errors) by the emotions represented (affect of the stimuli) is presented for

Table 14

Mean Accuracy Scores on the Diagnostic Analysis of Nonverbal Accuracy (DANVA) Receptive Child Voices Subtest Generated by Group

	Group		
Emotion	NLD n = 11	VLD n = 11	Control n = 11
Happy (6 items)	2.54 (0.68)	2.81 (0.40)	2.90 (0.30)
Sad (6 items)	4.18 (1.66)	4.00 (1.34)	4.36 (1.69)
Angry (6 items)	3.00 (0.00)	2.90 (0.30)	3.00 (0.00)
Fearful (6 items)	2.63 (1.69)	2.36 (1.28)	2.36 (1.43)

Note. Numbers in parentheses are standard deviations.

Table 15

Mean Errors on Diagnostic Analysis of Nonverbal Accuracy (DANVA) Receptive Subtests by Intensity of Stimuli and Group

DANVA Subtests	Group NLD n = 11	VLD n = 11	Control n = 11	F (2,30)
Adult Faces (High)	3.09 (1.81)	2.27 (1.10)	1.90 (.94)	2.23
Adult Faces (Low)	4.09[a] (1.13)	3.54[ab] (1.36)	2.72[b] (1.19)	3.39*
Child Faces (High)	2.45 (1.63)	1.36 (.90)	1.72 (1.27)	2.24
Child Faces (Low)	4.09 (1.70)	3.72 (1.19)	2.72 (1.84)	2.19
Adult Voices (High)	3.90 (1.57)	3.09 (1.64)	3.45 (1.36)	.78
Adult Voices (Low)	5.45 (1.80)	4.63 (1.62)	4.27 (2.41)	1.09

Note. Numbers in parentheses are standard deviations.

[a, b,] Means with different superscripts significantly different.

*($p < .05$).

the Adult Faces, Child Faces, and Adult Voices subtests in Appendix J, Tables J8 through J10.

To summarize findings of the examination of group and within subject differences related to the four emotions on the DANVA receptive subtests, the NLD group obtained a significantly lower rate of accuracy in comparison to both the VLD and the control group in identifying adult facial emotion and in identifying emotion conveyed through gestures. Although not reaching statistical significance, findings were in the expected direction in the identification of child facial expressions and emotions conveyed through an adult voice with NLD children accurately identifying fewer emotions than either the VLD or control group children. In general, NLD children performed with less accuracy than either VLD or control group children in the identification of all four emotions represented. Although variability was noted, the happy and sad emotions were more often accurately identified than those of anger or fear.

In summarizing the analyses related to the intensity of the stimuli presented (high vs low level), significant differences between groups were obtained when stimuli were presented by an adult face at low levels of intensity. NLD group children made significantly more errors than did control group children but not children with VLD. Although failing to reach statistical significance, mean comparisons for the remaining variables were in the expected direction.

Hypotheses 2 and 3

It was predicted that children with NLD would be rated by caretakers, and by themselves, as less competent socially, lower in self-esteem, and subject to increased risk for internalized types of emotional problems (i.e., depression and/or anxiety) than children with verbal learning deficiencies or psychiatric controls without learning impairment. To examine this prediction, the responses that caretakers gave on a measure of psychopathology (Personality Inventory for

Children - Revised) and that children gave on both a self-report personality measure (Personality Inventory for Youth) and a measure of self-esteem (Piers-Harris Children's Self-Concept Scale) were considered.

To test the hypothesis that ratings of self-esteem on the Piers-Harris would be lower for the group of NLD children than either the VLD or the control group children, a one-way Analysis of Variance was performed for each of the Piers-Harris subtests. The six dependent variables were total scale scores on each Piers-Harris cluster: Behavior, Intellectual and School Status, Physical Appearance and Attributes, Anxiety, Popularity, and Happiness and Satisfaction. The independent variable was group (NLD, VLD, control). In addition, a one-way Analysis of Variance was performed for the total Piers-Harris score.

Piers-Harris Children's Self-Concept Scale. The results of the Analyses of Variance for the six Piers-Harris clusters and the total Piers-Harris scale score did not emerge significant. One-way analyses are summarized in Appendix J, Table J11. Group means for the six cluster scores of the Piers-Harris are summarized in Table 16. Group means were similar between all three groups and in general reflected average to slightly lowered self-esteem for children in the study.

PIC-R Factor Scores. Further to the above calculations, analyses were performed to examine group differences in personality variables and psychopathology as reported by an adult caretaker. To test the hypothesis that the group of NLD children would be reported by parents/caretakers to display greater social incompetence and increased internalizing symptoms as compared to the group of VLD and control group children, a Multivariate Analysis of Variance was conducted. The four dependent variables were total scores on the PIC-R factor scales: Undisciplined/Poor Self-Control, Social Incompetence, Internalization/Somatic symptoms, and Cognitive Development. The independent variable was group (NLD, VLD, control).

Table 16

Mean Scale Scores on the Piers-Harris Subtest Clusters by Group

Cluster	Group NLD n = 11	VLD n = 11	Control n = 11
Behavior	10.00 (2.49)	8.27 (4.12)	10.90 (4.45)
Intellectual/Social Status	11.09 (3.20)	10.00 (3.96)	11.45 (3.95)
Physical Appearance/Attributes	8.72 (2.57)	9.36 (3.85)	8.36 (3.80)
Anxiety	6.81 (3.15)	6.63 (3.95)	9.64 (3.23)
Popularity	6.36 (2.85)	6.45 (3.31)	4.03 (3.03)
Happiness/Satisfaction	6.63 (2.20)	6.27 (3.16)	6.27 (3.10)

Note. Numbers in parentheses are standard deviations.

With the use of the Wilk's criterion, the combined DVs were not significantly related to group F (2, 30) = 1.77, $p > .05$. Despite the failure of the combined dependent variables to reach statistical significance, differences were noted for the cognitive development factor with both the NLD and the VLD groups receiving a significantly higher rate of reported concerns than the group of non-learning disabled controls. Group means for the four factor scale scores of the PIC-R are summarized in Table 17. Although mean comparisons between groups on the Social Incompetence factor failed to reach statistical significance, the pattern obtained was in the expected direction with the NLD group obtaining the highest mean scale score elevation for social incompetencies (80.4) in comparison to both the VLD (73.1) and the control group children (73.5). Groups did not differ from one another in terms of degree and type of psychopathology reported.

PIC-R Clinical Scales. Further analyses were conducted exploring PIC-R scale score elevations reported in previous research to represent the characteristics of nonverbal learning disabled children. To test the hypothesis that the group of NLD children would be reported by parents/caretakers to display a greater degree of withdrawal, social incompetencies, and more internalizing behavior symptoms as compared to the group of VLD and control group children, a Multivariate Analysis of Variance was conducted. The five dependent variables, chosen for the current analysis on the basis of scale score elevations reported in previous literature, were total scores on the following PIC-R clinical scales: Psychosis, Withdrawal, Social Skills, Anxiety, and Depression. The independent variable was group (NLD, VLD, control).

With the use of the Wilk's criterion, the combined DVs were not significantly related to group, F (2, 30) = .39, $p > .05$. Although mean comparisons between groups on the Social Skills variable failed to reach statistical significance, the results obtained were in the anticipated direction with the NLD

Table 17

Mean Scale Scores on the Four Personality Inventory for Children - Revised (PIC-R) Factors by Group

Factor	Group		
	NLD n = 11	VLD n = 11	Control n = 11
Undisciplined/Poor Self-Control	89.72 (16.03)	92.72 (11.43)	90.00 (24.53)
Social Incompetence	80.45 (11.95)	73.18 (14.07)	73.54 (16.14)
Internalization/Somatic Symptom	76.18 (19.95)	70.72 (16.21)	77.36 (20.13)
Cognitive Development	84.27[a] (25.19)	77.90[a] (17.31)	56.18[b] (13.15)

Note. Numbers in parentheses are standard deviations.

[a, b,] Means with different superscripts significantly different ($p < .01$).

group obtaining the highest mean scale score elevation for social skill deficits (78.5) in comparison to both the VLD (71) and control group children (72). The means obtained were also in the expected direction for the psychosis and withdrawal variables. Group means for the PIC-R clinical scale scores are summarized in Table 18.

PIY Clinical Scales. To test the hypothesis that the group of NLD children would themselves report a greater degree of withdrawal, social incompetence, and more internalizing behavior symptoms as compared to the group of VLD and control group childrenn, a series of one-way ANOVA's was conducted. The individual dependent variables were the scores obtained on the nine clinical scales of the PIY (Cognitive Impairment (COG), Impulsivity/Distractibility (ADH), Delinquency (DLQ), Family Dysfunction (FAM), Reality Distortion (RLT), Somatic Concern (SOM), Psychological Discomfort (DIS), Social Withdrawal (WDL) and Social Skills Deficit (SSK). The independent variable was group (NLD, VLD, control).

The Analysis of Variance for the Cognitive Impairment variable emerged significant, $F(2, 30) = 10.75$, $p < .001$. Subsequent mean comparisons using the Bonferroni test revealed that the VLD group children obtained a significantly higher scale elevation (59.0) representing increased cognitive impairment than either the group of controls (44.8) or the NLD group (50.3). While the NLD group was not found to differ significantly from the group of controls on the cognitive variable, results were in the expected direction with more concerns reported. Group means for the PIY clinical scale scores and one-way analyses for the dependent variables are summarized in Table 19. Mean comparisons for the remaining variables did not reach significance.

Clinical Diagnosis. To additionally test the hypothesis that NLD children

Table 18

Mean Scale Scores on the Personality Inventory for Children - Revised Clinical Scales of Psychosis, Withdrawal, Social Skills, Depression, and Anxiety by Group

	Group		
Clinical Scale	NLD n = 11	VLD n = 11	Control n = 11
Psychosis	92.9 (15.13)	85.5 (22.53)	88.0 32.26)
Withdrawal	66.6 (18.27)	62.7 (14.60)	65.1 (19.19)
Social Skills	78.5 (10.43)	71.1 (14.76)	72.1 (16.79)
Depression	81.1 (13.55)	80.2 (12.40)	84.1 (17.54)
Anxiety	77.6 (12.20)	74.8 (11.62)	80.0 (13.07)

Note. Numbers in parentheses are standard deviations.

Table 19

Mean Scale Scores on the Personality Inventory for Youth (PIY) Clinical Scales

	Group			
	NLD	VLD	Control	F (2,30)
Clinical Scale	n = 11	n = 11	n = 11	
Cognitive Impairment	50.3[a]	59.0[b]	44.8[a]	10.75*
Impulsivity/Distractibility	53.3	59.2	50.9	1.45
Delinquency	52.8	66.7	60.2	2.48
Family Dysfunction	54.3	60.6	57.6	.94
Reality Distortion	53.3	55.9	51.8	.53
Somatic Concern	52.0	53.0	47.9	.55
Psychological Discomfort	50.2	57.8	53.7	1.26
Social Withdrawal	54.6	56.7	52.5	.38
Social Skills Deficit	55.5	55.5	54.3	.03

[a, b,] Means with different superscripts significantly different ($p < .001$).

*$p < .001$.

would demonstrate more internalizing types of psychopathology than either VLD or control group children, the diagnoses assigned during treatment were examined. All children in the study were given a treatment diagnosis based on the criteria set forth by the American Psychiatric Association in the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV, 1994). Diagnoses were assigned by a staff psychiatrist and are presented in Appendix J, Table J12. For the purposes of this study, children were grouped into one of three possible categories based on their assigned diagnosis: Externalizing, Internalizing, and Other (e.g., psychosis, thought disorders). To test the hypothesis that NLD children would demonstrate more internalizing behavior disorders than either the group of VLD or the group of psychiatric controls a chi-square test of independence was performed.

The Pearson chi-square analysis used to test the independence of the diagnosis variable did not emerge significant, X^2 (4, $\underline{N}$ = 33) = 4.95, $\underline{p} > .05$. The NLD group demonstrated a larger percentage of internalizing behavior disorders (36.3%) than the VLD group (18.1%) but not the control group children (45.4%). The VLD group displayed the greatest percentage of externalizing behavior disorders (81.8 %). Percentages of group inclusion in each of the three diagnostic categories are included in Table 20. According to admission statistics from the Michigan Department of Community Health (1996), of 220 children admitted to Hawthorn Center over a two year period from 8/01/94 to 8/30/96, 45% received an internalizing behavior diagnosis, 37% externalizing, and 18% other.

Children reported far fewer concerns and symptoms reflecting emotional disturbance and developmental/cognitive delays than did their parents. In general, responses on the PIY, a child self-report measure, did not reflect scale elevations in the clinical range for psychopathology/cognitive delay, whereas, responses on the PIC-R, a parental report measure corresponding closely to the PIY,

Table 20

Percentage of Inclusion for Internalizing, Externalizing, and Other Diagnostic Categories by Group

Diagnostic Category	Group			
	NLD n = 11	VLD n = 11	Control n = 11	f
Internalizing	36.3	18.1	45.4	11
Externalizing	45.4	81.8	45.4	19
Other	18.1	0.0	9.1	3

demonstrated scale elevations reflecting serious impairment. Although differences were not found between the three study groups related to the defensiveness scales on both the PIC-R and the PIY, significant differences between parent and child reporting on this scale were found. Paired samples t-tests for child and adult responses on the defensiveness scale emerged significant (t (32) = -5.74, $p < .001$). Children (M = 46.8, SD = 13.62) demonstrated a significantly more defensive reporting style than did their parents (M = 32.6, SD = 9.61). Clinical scale score means and the defensiveness scale score means for all children for both the PIC-R and the PIY are included in Table 21. Correlations of PIC-R and PIY clinical scale scores are included in Appendix J, Table J13.

To summarize, in examining self-esteem, personality variables, and psychopathology through behavior rating scales, significant differences between groups were not found. However, in terms of psychiatric diagnosis, the NLD group demonstrated a larger percentage of internalizing types of psychopathology than the VLD group but did not differ from the group of controls. VLD group children displayed the greatest percentage of externalizing behavior disorders. Children reported far fewer concerns and symptoms reflecting emotional disturbance and developmental/cognitive delays than did their parents. Children demonstrated a significantly more defensive reporting style than did their parents.

Hypothesis 4

It was predicted that children with NLD would show higher rates of isolative play and lower rates of adaptive peer behavior than would children with verbal learning deficiencies or psychiatric controls in a naturalistic setting. To examine this prediction, the behaviors that subjects displayed in a structured free-play setting were considered.

Individuals' behavior interactions were observed and classified according to the categories outlined in Table 22 (i.e., adaptive/maladaptive/solitary

Table 21

Total Mean Scale Scores on Personality Inventory for Children - Revised (PIC-R) and Corresponding Personality Inventory for Youth (PIY) Defensiveness Scale and Clinical Scales

PIC-R Scales		PIY Scales	
Defensiveness	32.6	Defensiveness	46.8
Achievement	67.0	Cognitive Impairment	51.3
Intellectual Screening	70.6		
Development	60.6		
Depression	81.8	Psychological Discomfort	53.9
Anxiety	77.4		
Withdrawal	64.8	Social Withdrawal	54.6
Psychosis	88.8	Reality Distortion	53.6
Social Skills	73.9	Social Skills Deficit	55.1
Delinquency	102.0	Delinquency	59.9
Hyperactivity	76.0	Impulsivity/Distractibility	54.5
Family Relations	--	Family Dysfunction	57.5
Somatic Concerns	61.0	Somatic Concern	50.9

Note. Dashes indicate no score. PIY Cognitive Impairment scale was formed by merger of PIC-R Achievement, Intellectual Screening, and Development scales. PIY Psychological Discomfort Scale was formed by merger of PIC-R Depression and Anxiety Scales.

Table 22

Raw Data, Reliability Coefficients, and Normative Data for Observed Behaviors in a Free-Play Setting

	Peer Interaction Category			
	Adaptive	Maladaptive	Solitary Independent	Response to Staff
Agreement on occurrence	1348	217	631	313
Disagreement	72	36	55	36
Reliability Coefficient	94.9%	85.7%	91.9%	89.6%
Mean rate of behavior	53.7%	8.6%	25.1%	12.4%

independent/response to staff). Individual peer interactions during 8 free-play sessions of 30-40 minutes duration for 15 children matched for age (M age = 12 years), 5 with nonverbal learning disabilities, 5 with verbal learning disabilities, and 5 psychiatric controls, were observed by two raters, blind to the assumptions of the study, watching each child simultaneously. The order of observation of each child was changed each play session and was counterbalanced. Interrater reliability coefficients were calculated for each of the 4 behavior interaction categories by dividing agreements by agreements plus disagreements and multiplying by 100.

The resulting reliability coefficients ranged from 85.7% for maladaptive behavior to 94.9% for adaptive behavior. Cohen's kappa was calculated to correct for chance agreement (kappa = .8864). Table 22 contains summary data. The total frequencies with which the four types of peer interaction behaviors were observed across all play periods were: Adaptive 1348 (53.7%), Maladaptive 217 (8.6%), Solitary 631 (25.1%), and Response to Staff 313 (12.4%).

For each of the four peer interaction categories a one-way Analysis of Variance was performed comparing mean frequency of each interaction (adaptive, maladaptive, solitary independent, response to staff) by group (NLD, VLD, Control). Results are summarized in Appendix J, Table J14. Means for the four peer interaction categories are summarized in Table 23.

Solitary Independent Play.

As predicted, results of this analysis examining solitary independent behavior revealed a significant main effect for Solitary play [F (2,14) = 4.714, $p < .03$]. Children with NLD showed the highest rate of solitary play (64.30). Subsequent mean comparisons using the Bonferroni test indicated that this rate was significantly higher than that of controls (26.70) but, although in the expected direction, not significantly higher than that of children with VLD (40.50).

Table 23

Means of the Four Peer Interaction Categories Observed in a Free-Play Setting by Group

	Group		
Category	NLD n = 5	VLD n = 5	Control n = 5
Adaptive Peer Interaction	71.2	106.3	98.4
Maladaptive Peer Interaction	9.6	18.7	19.4
Solitary Independent Play	64.3	40.5	26.7
Response to Staff	28.0	8.5	29.5

Adaptive Peer Interaction.

Results of this analysis examining adaptive behavior approached significance [$F(2,14) = 3.453$, $p < .06$]. The group of NLD children emitted the lowest number of adaptive behaviors (72.1) when compared to VLD children (106.3), and Psychiatric Controls (98.4).

Maladaptive Peer Interaction.

Results of this analysis examining maladaptive behavior was not significant. The group of NLD children emitted the lowest rate of maladaptive peer interactions (9.60) as compared to VLD children (18.70) and Psychiatric Controls (19.40).

Response to Staff.

Results of this analysis examining response to staff behavior was not significant. The group of VLD children emitted the lowest rate of interaction with staff behavior (8.50) as compared to NLD children (28.0) and Psychiatric Controls (29.5).

To summarize findings in a free-play setting, results were in the expected direction with NLD children displaying the highest rate of solitary independent behavior. NLD children demonstrated the fewest adaptive and maladaptive peer interactions.

CHAPTER IV

DISCUSSION

The focus of the present study was on comparing perception of nonverbal information, social cues, and emotional adjustment of three groups of clinically referred children differentiated on the basis of varying patterns of cognitive skill. More specifically, the aim was to determine how children with visualspatial impairment, in a psychiatric setting, differ from those with deficiency in language and from those without learning impairment. A second aim was to examine how these children behave in actual social interactions. NLD, VLD, and control group children, matched for age and gender, were compared on measures of discrimination of emotion cues, emotional adjustment, and self-esteem. The behavior of a subset of the entire sample was also examined in the context of an In Vivo social situation.

Results are almost invariably in the expected direction, but statistical significance was difficult to demonstrate due to the small sample size, which was practically limited by the rare occurrence of NLD. A power analysis (Cohen, 1977) using estimated differences for the comparison of group performances on the DANVA indicated that group membership of 20 would be sufficient to detect relatively small deviations, which makes the significant results obtained in the present study even more remarkable.

The nonverbal learning disabled children who participated in this study demonstrated significant differences when compared with control group children in their ability to accurately interpret nonverbal cues of emotion conveyed through adult facial expressions, particularly those communicated at low levels of intensity, and body gestures. NLD children consistently performed with less accuracy than either VLD or control group children when stimuli were presented in both visualspatial and auditory channels. Most importantly, impaired social interactions

were observed in a free-play setting with NLD children displaying the highest rate of solitary independent behavior, a rate significantly higher than that of controls, and the fewest adaptive interactions with peers. These findings are consistent with the premise of this study that children with visualspatial deficits would show impairment in the interpretation of nonverbally expressed emotion which in turn would lead to similarly impaired social interactions.

The intention of the current study was to link nonverbal social information processing skill to emotional status and peer social interactions. The results as they relate to these three areas are discussed in the following section.

Interpreting social information. Information with emotional value is taken in through multiple channels: e.g., visual, auditory, physical/body sensation produced by touch. This information is most often received simultaneously and is sometimes contradictory. The individual must be able to process cues with emotional content using all information received through these multiple sources to formulate a judgement about the emotional state of another. If one is unable to fully process the material conveyed through any one channel, errors in judgement can occur. Participants in the current study were presented with cues conveyed through both a spatial (photographs) and auditory modality (audiotape), one channel at a time.

It was hypothesized that children with spatial processing skill deficiency (NLD group) would be less accurate at decoding nonverbal information, particularly that presented in a visualspatial modality, than would children with verbal learning deficiencies (VLD group) or psychiatric controls without learning impairment. It was predicted that VLD and control group children would be more proficient at identifying basic affects (happy, sad, angry, fearful) presented through photographs and audio tape than would NLD children.

In this study, statistically significant differences were found between NLD and control group children in the decoding of adult facial expressions and body gestures on the DANVA. NLD children were far less accurate in the identification of these nonverbally expressed emotions than were controls. Comparisons between NLD and VLD children did not reach significance, although the findings were in the expected direction of lower accuracy for NLD children. Statistically significant differences were not found between the three groups in the decoding of stimuli on the DANVA postures and listening subtests. However, the NLD children again performed less accurately than either the VLD or control group children.

There was not a significant main effect for group in decoding specific emotions. However, the NLD group did display a significantly lower rate of accuracy in decoding sad adult facial expressions when compared to VLD children. Similarly, the accuracy rate for the identification of sad adult facial expressions was lower for the NLD group than for the control group children but results were not statistically reliable. As expected, the general trend was for the NLD group to accurately identify fewer expressions of emotion than either the VLD or the control group children. At low levels of stimulus intensity, NLD group children made significantly more errors than did control group children. These results suggest that NLD children may have a potentially greater difficulty in dealing with more subtle expressions.

Interesting results were found in examining the status (child vs adult) and modality (visualspatial vs auditory) of the stimulus presented. Significant findings emerged for the effect of status and the Status x Modality interaction. In general, the participants produced a significantly higher rate of accurate responses on DANVA subtests when a child stimulus was utilized than when the stimulus was that of an adult and when stimuli were presented in a visualspatial rather than in an

auditory channel. For all groups, the lowest rate of accuracy was obtained when stimuli were presented through an auditory channel by an adult while the highest rate of accuracy was obtained when stimuli were presented in a visualspatial channel by a child. NLD children demonstrated significantly less accuracy than control group children when presented with adult stimulus in a visualspatial modality. Although not reaching statistical significance the same pattern was found in comparisons to VLD children. The overall trend was for the NLD children to perform with less accuracy than either VLD or control group children when stimuli were presented in both visualspatial and auditory modalities.

While the lack of consistently significant group differences is disappointing, the overall trend of NLD children demonstrating less accuracy than either VLD or control group children in the discrimination of nonverbally expressed emotion, particularly facial affect, is consistent with previous findings (McCauley et al., 1987; Ozols & Rourke, 1985; Wiig & Harris, 1974) which noted associations between impairment in visualspatial skills and the decoding of nonverbal emotion cues. Results are also consistent with the predictions of the current study. Lack of statistically significant results may be related to the relatively small sample size and/or to differences between subjects in the degree of impairment in visualspatial processing skill. Some previous studies have used neurological evidence of right hemisphere dysfunction and/or neuropsychological evaluations to define groups which may result in more powerful group differences. Findings cannot be expected to be as strong in less differentiated groups. Nevertheless, the trend noted in the current study with NLD children almost invariably performing less accurately in the identification of universal facial affects is compelling.

The finding that emotions portrayed by a child, as opposed to an adult, through both photographs and audio tape are more accurately identified is understandable if one thinks about how children express feelings. Children tend to

demonstrate affect more readily and in an unambiguous style. They smile more broadly, cry more loudly, and pout more easily. The behavior of an adult can be thought to be childlike if the adult is unable to regulate facial expressions which convey internal emotional states, e.g., disappointment. It may be more difficult for a child to discern emotion expressed by an adult because the child has learned that adult expressions are more subtle and meaning is conveyed through more than one channel.

Self-esteem and emotional status. In this study, differences were not found between VLD, NLD, and control group children in self-esteem ratings on the Piers-Harris Children's Self-Concept Scale. In general, children rated themselves as having average to somewhat lowered levels of self-regard in the areas of behavior, social status, physical attributes, popularity, and happiness. As expected, significant group differences were found in cognitive development on both the Personality Inventory for Children-Revised and the Personality Inventory for Youth. Both scales measure cognitive development and emotional status as reported by either a parent (PIC-R) or by the child (PIY). Parents and children in both the NLD and the VLD groups reported a significantly greater degree of cognitive impairment than parents and children in the group of non-learning disabled controls.

Although comparisons between groups on social competence failed to reach statistical significance, the pattern obtained was in the anticipated direction. Parents of NLD children reported a higher degree of social incompetency than parents of VLD and control group children. However, children themselves did not report between group differences in social skills or social withdrawal. Surprisingly, groups did not differ significantly from each other on further measures of emotional adjustment as gauged by the PIC-R and PIY. However, there was a trend for NLD group children to be diagnosed by psychiatrists as

having an internalizing behavior disorder more often than VLD children, but not than control group children. VLD children were assigned the overwhelming majority of the externalizing behavior disorders diagnosed.

The lack of significant differences in self-concept and emotional adjustment was an unexpected finding in light of previous research. Using the PIC, Strang and Rourke (1985) examined the behavioral characteristics of children with visualspatial skill deficits. In comparisons with two other groups of LD children, one with evidence of language impairment, the visualspatial impaired children were characterized by PIC profile elevations on measures of psychosis, social skills, anxiety, withdrawal, and depression compared to nonsignificant findings of the other two groups. In White, Moffitt, and Silva's (1992) longitudinal investigation, specific arithmetic disabled children were found to have similar neuropsychological profiles to NLD children as defined by Rourke (1989). The specific arithmetic disabled subjects in the White et al. study demonstrated the greatest degree of overlap between internalizing psychopathology and an NLD neuropsychological profile.

In the current study, parents of NLD children did report a pattern of higher PIC-R scale elevations for social skill deficits, psychosis, and withdrawal than parents of the other two groups; however, differences between groups did not reach statistical significance. While the Strang and Rourke study used a small set of subjects ($\underline{n}$ = 7 in each group), the White, Moffitt, and Silva study was larger ($\underline{n}$ = 17 specific-arithmetic disabled, 27 specific-reading disabled, 63 generally disabled). Neither of the above noted studies used a psychiatric sample suggesting that NLD children may exhibit more internalizing behaviors and social skill deficits when compared to other groups of LD children but that these differences wash out when compared to groups of children with identified emotional problems. This supposition is consistent with the trend noted in the present study

with NLD children receiving more internalizing diagnoses than VLD children, but not control group children in a psychiatric hospital setting.

Within Rourke's developmental framework, NLD individuals are thought to become increasingly withdrawn, depressed, and even suicidal as they age. Supporting this notion is the report of Rourke, Young, Strang, and Russell (1985) who found depression and suicide attempts more frequent among NLD adults. The children in the current study are relatively young (9 to 14 years) leaving open the possibility that internalizing psychopathology and social difficulties may increase in time. However, future comparisons of groups in later adolescence and adulthood would be necessary to gauge such a trend.

Interestingly, the high degree of concern parents reported regarding the behavioral characteristics of their children was not paralleled by their children. Scale score elevations on the PIC-R generally reflected a serious clinical range of psychopathology while those on the PIY, the corresponding self-report measure, did not. Scale elevations on the PIY were generally within the nonclinical range. Children either did not see the problems within themselves that the parents reported, did not view their behaviors as problematic, or denied difficulties. This result was unexpected since it was thought by Lachar and Kline (1992) that child report is often positive and parent report negative in the identification of both antisocial behaviors and internal emotional states (i.e., anxiety, depression, somatic concerns, peculiarities of thought) that may not be consistently represented in overt behavior. Children in the current study were found to differ significantly from their parents in terms of defensiveness when reporting on their own behavior and internal emotional states. This defensive style may account for the disparity noted between the parent and child report. Similar findings were noted for an unselected sample of children and their parents in comparisons of responses on the PIC - R and PIY (Saunders, 1996). Unlike adults, children usually receive psychological

services because problems have been identified by others, most often by a teacher or parent, rather than by themselves. It may be that children are not as bothered by their behaviors, do not perceive their behavior as different from that of other children, or may be unaware that their behavior disturbs others. Bruininks (1978) reported that LD children, less socially accepted by their peers, failed to perceive their poor social standing and overestimated their social acceptance. It may be that children with emotional impairment make similar errors in perception.

Significant differences were not found between groups in terms of diagnosis. However, the NLD group did receive more frequent diagnoses reflecting internalizing types of behavior disorders than the other group of LD children but not than the group of psychiatric controls. The VLD group received the largest percentage of externalizing types of diagnoses. This pattern is consistent with the previously noted findings that, in comparison with other LD groups, NLD children tend to exhibit more internalizing types of behavior problems. However, it appears again that differences tend to wash out when compared to other groups with identified emotional impairment.

Group differences in a free-play setting. Significant differences in solitary play interactions were found between the NLD group and control group children observed in a structured free-play setting. NLD children also engaged in a higher rate of isolative activity than the VLD group. Although the failure of the difference between the NLD and VLD group to reach statistical significance may be related to small sample size ($n = 5$ in each group), the study predictions were supported despite this limitation. As expected, the NLD group children tended to play alone despite close proximity to peers and to make limited and ineffective efforts to interact with others. In addition to engaging in more isolative play than controls, children with nonverbal learning disabilities showed a persistent trend toward emitting fewer adaptive peer interaction behaviors than did comparison

children (e.g., maintaining eye contact with a peer, responding to questions, paying attention during a game). To illustrate, one child, often while lying on the floor, asked others to play a game with him or to hand him an object but did not make eye contact nor direct his request to anyone in particular. This child was generally ignored by peers although he talked much of the time. Another child asked staff persons how they were feeling (e.g., do you feel hungry, are you tired) and made irrelevant statements such as "you lost a lot of weight since I saw you" (the day before). NLD children were often noted by observers to be talking but to not direct conversation towards others. The talkativeness of these children is consistent with reports of other researchers who noted an association between talkativeness and right hemisphere dysfunction (Ozol & Rourke, 1985). These overtures appear to be awkward attempts to make social contact with others and convey the expectation, as seen with the child lying on the floor, that overtures will not be reciprocated.

It is further interesting to note that the NLD children emitted the lowest rate of maladaptive peer interactions which included such behaviors as physical aggression, verbal arguing or name calling, and uncooperative play. Taken together with the comparatively low rate of adaptive behavior interactions observed, a compelling portrait of social isolation and lack of meaningful connectedness with others is depicted. Given the finding of the current study that NLD children are very aware of cognitive skill deficits but do not report significant differences in social skill and social withdrawal it may be that these children do not perceive themselves as having deficiency in peer social interactions and may not, at this stage in development, feel as dissatisfied with themselves as previously thought.

Limitations

Subjects in the present study were classified as learning disabled on the basis of a pattern of cognitive strength and/or weakness obtained primarily on two measures, the Wechsler Intelligence Scale for Children-Third Edition, and the Wide Range Achievement Test. The current study did not allow for all children to be given full neuropsychological evaluations or for medical assessment of hypothesized right hemisphere dysfunction. However, several of the NLD group children did have neuropsychological evaluations which in all cases confirmed the NLD diagnosis and lend credibility to the selection criteria. Evidence of language/reading impairment for the VLD group was corroborated by a language clinic teacher certified in reading instruction.

Differences between the Verbal and Performance scale scores of the Wechsler intelligence scale cannot be entirely attributed to neurocognitive deficits. Cultural, experiential, and language influences can impact on hemispheric processing differences. Studies testing the differentiation hypothesis have indicated that cultural-ethnic (Dershowitz & Frankel, 1975) and language factors (Sibitani, 1980) may also account for VIQ/PIQ differences.

Cultural differences may also impact emotion perception ability. Several participants of the present study were of African-American descent (5 NLD, 3 VLD, and 2 controls). While subjects were matched for age and sex, it was not always possible to match for ethnicity. There is evidence to suggest that sex and race interact to influence the ability to recognize different emotions (Eiland & Richardson, 1976). It was found in the present study that the age of the individual displaying the emotion influenced the recognizability of the emotion and that children were better at identifying emotion displayed by other children. Similarly, other personal characteristics of the stimulus are likely to have impact. The majority of the photographs used in this study were of Caucasian individuals,

although those of other races were represented. Children may have increased difficulty in identifying the affect of individuals from ethnic backgrounds different from their own. Consequently, the African-American subjects may have been at a disadvantage. While comparisons between the Caucasian children and the African-American children who participated in the study did not reveal significant differences between the two groups, the impact these differences may have had in an actual social interaction are not known.

Photographs and audio taped stimuli were employed to convey information with emotional content in the current study. However, it is thought that the use of films and live presentations produce more accurate responses than static stimuli such as photographs (Cook, 1971). Other research suggests that children respond differently to In Vivo provocations by a peer confederate than to videotaped presentations of provocations by same aged peers (Vitaro & Pelletier, 1991). The purpose of the current study was to detect differences between groups in the identification of affect presented through one channel at a time. However, in reality affective information comes through multiple conduits simultaneously and impairment in the ability to receive information through any one can be compensated for through the heightening of another. For example, deaf individuals rely more on visual information than those without hearing impairment. Difficulty in identifying affective cues presented through photographs does not necessarily generalize to impairment in identifying affective information in an actual social interaction.

This study employed trained observers to record the behavior of participants in a structured free-play setting. However, children had adult supervision in the play room and were aware that their interactions could be observed by others through a one-way mirror. Consequently, although this arrangement represented an actual social interaction with peers, it was contrived to some degree.

Additionally, children were provided with a selection of games and materials which were varied from session to session in order to structure the play and to maintain interest. Children may behave differently towards each other in a less structured environment and without adult supervision. However, children paid little to no attention to the one-way mirror in the play room.

Subjects in this study were asked to fill out lengthy questionnaires about their behavior and thoughts in the presence of the researcher. However, Weller and Strawser (1987) warn that personality and behavior rating scales may not sufficiently identify the pattern of verbal strengths, spatial impairment, and social inefficiency that distinguish the NLD individual and note that the more important concern should be placed in the identification and remediation of visualspatial deficits.

Children in this study were assured that their responses would be kept confidential and would not impact on their treatment in any way. However, it is possible that subjects tended to deny problems fearing that their responses would somehow affect the length of their treatment or would be conveyed to a parent or the child's therapeutic treatment team. This is one possible explanation of the surprisingly low rate of concerns expressed by children on the Personality Inventory for Youth and the Piers-Harris Children's Self-Concept Scale. This notion is supported by the finding of the current study that children were significantly more defensive in their reporting style than were their parents. Additionally, the children in the current study receive extensive testing as part of their treatment which is similar in format to that utilized in this study and are aware that these results are reported to parents and teachers.

Parents in this study were asked to complete a questionnaire describing their family and their child. The likelihood that parents convey their own needs and subjective viewpoints regarding the environment they provide their children and

their children's behavior cannot be understated. Many parents declined to respond to questions on the Personality Inventory for Children-Revised which conveyed information about the family. Consequently, on a number of protocols the Family Relations scale could not be scored. While parents were informed that their responses, and those of their children, would remain confidential it is possible that parents, as with children, did not completely trust that this assurance would be kept. It may be that parents reported a high degree of behavior problems with their children in order to justify the need for psychiatric treatment. It seems also that parents may be highly defensive regarding the release of information related to themselves or to their homes. Some of the families of the children involved in the current study have had interventions by social service and protective service agencies and may be wary of giving out personal information.

Despite the above noted concerns about the subjectivism and personal needs of those completing behavior rating measures, both parents and children appeared to approach this task in a thoughtful manner and asked appropriate questions during the process. Behavior report measures allow for a great deal of information to be conveyed in a structured format and permit informants to acknowledge and convey concern regarding behavior, thoughts, and feelings without the direction of the examiner which may influence responses. Those who did not wish to participate in the project were not pursued and all were assured that choosing to participate, or not, would in no way affect treatment.

Implications

Findings suggested that children characterized as nonverbal learning disabled are less efficient in the decoding of affective information conveyed through nonverbal cues such as facial expression and body gestures. Additionally, it appeared that they may be at a disadvantage in social situations with peers. The findings of the present study support the hypothesis that the social interaction skills

of LD children vary in relation to differing patterns of cognitive strength and impairment. The NLD children in the present study demonstrated observable isolative pursuits and tendencies towards withdrawal when in a social environment but did not appear to perceive themselves as emotionally impaired or different from peers in areas other than that of the cognitive/academic. However, children in general who participated in the study did not view themselves as having emotional impairment or poor self-concept despite the diagnosis of serious behavior disorders necessitating psychiatric intervention. In the current study, children were not differentiated on the basis of length of care and those nearing the end of treatment may evaluate themselves differently from those just beginning. The impressions of parents, however, were quite different. This discrepancy raises important concerns regarding the effectiveness of treatment given recipients who may not agree with the need for intervention.

A possible treatment strategy in working with NLD defined children would involve the development of social competency skills. Weller and Strawser (1987) suggest that, following early and accurate diagnosis, concentration on the visual and spatial deficiencies underlying adaptive skill problems, rather than on emotional concomitants, may be the more effective method of intervention. These researchers cite the teaching methods of Minskoff (1980) as a model. The approach designed by Minskoff stresses the importance of tailoring educational programs to the individual social deficit observed and to train children to identify specific visual and auditory cues in social interactions. In this education process it is necessary that assessment and remediation occur within four basic communication systems: kinesics, proxemics, vocalic, and artifactual. The improvement of visual perception, imaging, attention, and memory skills is imperative. In addition, the presentation of educational material and compensatory

learning strategies in modalities other than the visualspatial could be a potentially rewarding technique.

While the primary responsibility for the development of appropriate mediation strategies to compensate for impairment in visualspatial skills is most aptly placed in the educational setting, these children often require therapeutic intervention related to social deficiencies. A traditional talking therapy approach is not likely to be useful when social and adaptive skill training is required. One way to begin may be to use photographs of facial expressions displaying differing affective states and allow individuals to have practice in the identification of the emotion conveyed. Another approach would be to increase eye contact and visual attention during interactions with others. Much affective information is missed if one is not looking at another when speaking. Role playing and modeling by a therapist can be a useful tool. The model can begin by conveying a basic emotion with an exaggerated facial expression while requiring that the individual pay close attention to the face. More subtle facial expressions of emotion and more complicated emotions can be conveyed once the individual demonstrates proficiency in interpreting exaggerated expressions. Tone of voice and verbal information about one's affective state can gradually be associated with facial expressions. Finally, it would be necessary for the individual to develop an increased awareness of others and to verbalize how another was feeling based on nonverbal affective information. Small group interventions with peers would aid in this process with the group leader pointing out nonverbal cues and associating emotional meaning. Training with parents to help them use some of the same techniques could also provide some benefit.

Directions for Future Research

Results of this study suggested a relationship between visualspatial deficiency and social interaction impairment. However, only weak associations

with the emotional factors thought to characterize NLD individuals emerged. The parents of NLD children reported more social skill deficits and internalizing types of emotional problems than did parents of VLD children but these differences were not significant. In addition, children themselves did not perceive themselves as different in these areas. The present study involved comparisons of children with identified emotional illness rather than LD and non LD individuals without identified emotional illness. Further studies using larger groups of children from similar populations with identified emotional impairment may provide clarification.

Considering the developmental component of the NLD model, the degree of social and emotional impairment is thought to worsen as the individual matures. The subjects in this study are representative of latency age to early adolescent youth. A study comparing the emotional features of young NLD defined individuals to the academic/career accomplishments and marital/relationship satisfaction of those in late adolescence and early adulthood may provide support for this supposition.

The direct observation component of this study provided support of the hypothesized social incompetency and isolative behavior tendencies of the NLD group. However, all subjects in the current study were not observed in a social interaction setting. It will be necessary to confirm the tendency observed with larger groups of individuals in order to generalize to the NLD population.

The direct observation portion of this study provided a structured setting with adult supervision and a one-way mirror from which to observe interactions in a psychiatric hospital. While the supervision and structure that such a setting provided were necessary the behavior observed may be different from that of children in a more spontaneous setting or naturalistic environment. Observing

children in an academic setting or during a daily activity such as a mealtime may provide an closer approximation of child behavior tendencies.

The use of static materials such as photographs and slides provide only preliminary information about one's ability to interpret emotion. It is not clear how much more information videotaped presentations provide. Additional research using actual children and adults as models would give a more realistic indication of the ability to identify the affective state of another.

Finally, the interaction style, child rearing techniques, and psychopathology of a parent can have strong impact on an individual's emotional well-being, social interaction style, and coping skills. Although severely neglected or abused children were not included in this study, these factors were not closely explored and may have contributed to the behavior and emotional characteristics of the children included in this research. As noted earlier, parents were reluctant to provide family related information. Evaluation of family characteristics in future projects would offer important information related to observed child behaviors.

While interpersonal and social skill deficiencies have long been observed in comparisons between LD and non LD children, it has more recently been thought that social deficits may be more related to a specific pattern of cognitive deficiency rather than to learning disability as a whole. More specifically, the current study examined the emotion perception skills of children identified with visual spatial impairment and those with language impairment. The findings of the current study suggest that individuals with visual spatial deficiency not only perform less well on emotion perception tasks involving nonverbal cues but also demonstrate impairment in a social setting. These results lend support to the premise that deficiency in nonverbal information processing skills can be most debilitating and have serious impact in the interpersonal arena.

References

Achenbach, T. M. (1966). The classification of children's psychiatric symptoms: A factor analytic study. Psychological Monographs, 80, 1-37.

Achenbach, T. M. (1979). The child behavior profile: An empirically based system for assessing children behavioral problems and competences. International Journal of Mental Health, 7, 24-42.

Achenbach, T. M. (1985). Assessment and taxonomy of child and adolescent psychopathology. Newbury Park, CA: Sage.

Achenbach, T. M., & Edelbrock, C. S. (1978). The classification of child psychopathology: A review and analysis of empirical efforts. Psychological Bulletin, 85, 1275-1301.

Achenbach, T. M., & Edelbrock, C. S. (1979). The child behavior profile, II. Boys aged 12-16 and girls aged 6-11 and 12-16. Journal of Consulting and Clinical Psychology, 47, 223-233.

Achenbach, T. M., & Edelbrock, C. S. (1981). Behavioral problems and competancies reported by parents of normal and disturbed children aged four through sixteen. Monographs of the Society for Research in Child Development, 46, 1 (No. 188).

Ainsworth, M. S. (1979). Infant-mother attachment. American Psychologist, 34, 932-937.

American Psychiatric Association. (1994). Diagnostic and statistical manual of mental disorders (4th ed.). Washington, DC: Author.

Bakker, D. J. (1979). Perceptual asymmetries and reading proficiency. In M. Bortner (Ed.), Cognitive growth and development (pp. 134-152). New York: Brunner/Mazel.

Bakker, D. J. (1990). Neuropsychological treatment of dyslexia. New York: Oxford University Press.

Bakker, D. J. (1992). Neuropsychological classification and treatment of dyslexia. Journal of Learning Disabilities, 25, 102-109.

Black, F. W. (1974). Self-concept as related to achievement and age in learning disabled children. Child Development, 45, 1137-1140.

Blanck, P. D., Buck, R., & Rosenthal, R. (1986). Nonverbal communication in the clinical context. University Park: Pennsylvania State University Press.

Borod, J. C., Koff, E., & Caron, H. S. (1983). Right hemispheric specialization for the expression and appreciation of emotion: A focus on the face. In E. Perecman (Ed.), Cognitive procession in the right hemisphere (pp. 83-110). New York: Academic Press.

Bradshaw, J., & McKenzie, B. (1971). Judging outline faces: A developmental study. Child Development, 32, 929-937.

Broder, P. K., Dunivant, N., Smith, E. C., & Sutton, L. P. (1981). Further observations on the link between learning disabilities and juvenile delinquency. Journal of Educational Psychology, 73, 838-850.

Bruininks, V. L. (1978). Actual and perveived peer status of learning disabled students in mainstream programs. Journal of Special Education, 12, 51-58.

Bryan, T. H. (1974). Peer popularity of learning disabled children. Journal of Learning Disabilities, 7, 661-625.

Bryan, T. H. (1977). Learning disabled children's comprehension of nonverbal communication. Journal of Learning Disabilities, 10, 501-506.

Bryan, T. H., & Bryan, J. H. (1977). The social-emotional side of learning disabilities. Behavior Disorders, 2, 141-145.

Bryan, T. H., & Bryan, J. H. (1978). Understanding learning disabilities (2nd ed.). Sherman Oaks, Calif: Alfred Publishing Co.

Buck, R. (1975). Nonvervbal communication of affect in children. Journal of Personality and Social Psychology, 31, 644-653.

Buck, R., Miller, R. & Caul, W. (1974). Sex, personality, and physiological variables in the communication of affect via facial expressions. Journal of Personality and Social Psychology, 30, 587-596.

Bugental, D. E., Kaswan, J. W., & Love, L. R. (1970). Perceptions of contradictory meanings conveyed by verbal and non-verbal channels. Journal of Personality and Social Psychology, 16, 647-655.

Charlesworth, W. R. & Kreutzer, M. A. (1973). Facial expression of infant and children. In P. Ekman (Ed.), Darwin and Facial Expression (pp. 91-168). New York: Academic Press.

Cohen, J. (1977). Statistical power analysis for the behavioral sciences (rev. ed.). New York: Academic Press.

Cook, M. (1971). Interpersonal perception. Middlesex, England: Penguin Books.

Darwin, C. (1872). The expression of the emotions in man and animals. London: John Murray.

Darwin, C. (1877). A biographical sketch of an infant. Mind, 2, 285-294.

Denckla, M. B. (1978). Minimal brain dysfunction. In J. S. Chall & A. F. Mirsky (Eds.), Education and the brain (pp. 223-268). Chicago: University of Chicago Press.

DePaulo, B. M., Rosenthal, R., Eisenstat, R. A., Rogers, P. L., & Finkelstein, S. (1978). Decoding discrepant non-verbal cues. Journal of Personality and Social Psychology, 36, 313-323.

Dershowitz, Z., & Frankel, Y. (1975). Jewish culture and the WISC and WAIS test patterns. Journal of Consulting and Clinical Psychology, 42, 126-134.

Dodge, K. A. (1980). Social cognition and children's aggressive behavior. Child Development, 51, 162-170.

Doehring, D. G., & Hoshko, I. M. (1977). Classification of reading problems by the Q-technique of factor analysis. Cortex, 13, 281-294.

Edmonson, B., DeJung, J. E., & Leland, H. (1965). Social perception (nonverbal communication) training of retarded adolescents. Mental Retardation, 3, 7-9.

Edwards, R., Manstead, A. S. R., & MacDonald, C. J. (1984). The relationship between children's sociometric status and ability to recognize facial expression of emotion. European Journal of Social Psychology, 14, 235-238.

Eiland, R, & Richardson, D. (1976). The influence of race, sex, and age on judgments of emotion portrayed in photographs. Communication Monographs, 43, 167-175.

Ekman, P. (1970, September). Universal facial expressions of emotion. Paper presented at the International Sociological Association Meetings, Bulgaria.

Ekman, P., & Friesen, W. V. (1971). Constants across cultures in the face and emotion. Journal of Personality and Social Psychology, 17, 124-129.

Epstein, H. (1985). Piers-Harris Self-Concept Scale (The Way I Feel About Myself). In J. Mitchell, Jr. (Ed.), The Ninth Mental Measurements Yearbook: Volume II (pp. 1167-1170). Nebraska: University of Nebraska Press.

Feldman, R. S., White, J. B., & Lobato, D. (1982). Social skills and nonverbal behavior. In R. S. Feldman (Ed.), Development of Nonverbal Behavior in Children (pp. 259-278). New York: Springer Verlag.

Felleman, E. S., Barden, R. C., Carlson, C. R., Rosenberg, L., & Masters, J. C. (1983). Children's and adults' recognition of spontaneous and posed emotional expressions in young children. Developmental Psychology, 19, 405-413.

Field, T. M., & Walden, T. A. (1981). Production and perception of facial expresions in infancy and early childhood. In H. Reese & L. Lopsitt (Eds.), Advances in child development and behavior, 16, 169-211.

Field, T. M., & Walden, T. A. (1982). Production and discrimination of facial expressions by preschool children. Child Development, 53, 1299-1301.

Fletcher, J. M., & Satz, P. (1985). Cluster analysis and the search for learning disability subtypes. In B. P. Rourke (Ed.), Neuropsychology of learning disabilities: Essentials of subtype analysis (pp. 40-64). New York: Guildford Press.

Frilund, A. J., Ekman, P., & Oster, H. (1987). Facial expression of emotion: Review of literature 1970-1983. In A. W. Siegman & S. Feldstein (Eds.), Nonverbal behavior and communication (pp. 143-224). Hillsdale, NJ: Erlbaum.

Fuerst, D., Fisk, J. L., & Rourke, B. P. (1989). Psychosocial functioning of learning disabled children: Replicability of statistically derived subtests. Journal of Consulting and Clinical Psychology, 57, 275-280.

Glitter, A. G., Mostofsky, D. I., & Quincy, A. J. (1971). Race and sex differences in the child's perception of emotion. Child Development, 42, 2071-2075.

Goldberg, E. & Costa, L. D. (1981). Hemisphere differences in the acquisition and use of descriptive systems. Brain and Language, 14, 144-173.

Gouchie, C. & Kimura, D. (1991). The relationship betwen testosterone levels and cognitive ability patterns. Psychoneuroendocrinology, 16, 323-334.

Guertin, W. H., Ladd, C. E., Frank, G. H., Rabin, A. I., & Hiester, D. S. (1966). Research with the Wechsler Intelligence Scale for Adults: 1960-1965. Psychological Bulletin, 66, 385-409.

Hall, J. A. (1978). Gender effects in decoding nonverbal cues. Psychological Bulletin, 85, 845-857.

Hampson, E. (1990). Estrogen-related variations in human spatial and articulatory-motor skills. Psychoneuroendocrinology, 15, 97-111.

Harnadek, M. C. S., & Rourke, B. P. (1994). Principal identifying feature of the syndrome of nonverbal learning disabilities in children. Journal of Learning Disabilities, 27, 144-154.

Helechko, A. D. (1977). Self-esteem and perception of parental behavior in children with learning disabilities. (Doctoral dissertation, University of Michigan 1977). Dissertation Abstracts International, 38, 359B.

Hooper, S. R., & Willis, W. G. (1989). Learning disability subtyping. New York: Springer-Verlag.

Huberty, C. J., & Morris, J. D. (1989). Multivariate analysis versus multiple univariate analyses. Psychological Bulletin, 105, 302-308.

Hynd, G. W., Obrzut, J. E., Hayes, F., & Becker, M. G. (1986). Neuropsychology of childhood learning disabilities. In D. Wedding, A. M. Horton, & J. Webster (Eds.), The neuropsychology handbook: Behavioral and clinical perspectives (pp. 456-485). New York: Springer.

Interagency Committee on Learning Disabilities. (1987). Learning disabilities: A report to the U.S. Congress. Washington, D.C: Author.

Izard, C. E. (1971). The face of emotion. New York: Meredith Corporation.

Izard, C. E., Huebner, R. R., Risser, D., McGinnis, G., & Dougherty, L. (1980). The young infant's ability to produce discrete emotion expressions. Developmental Psychology, 16, 132-140.

Jastak, J., & Jastak, S. (1978). The Wide Range Achievement Test. Wilmington, DE: Guidance Associates.

Jastak, S., & Wilkinson, G. S. (1984). The Wide Range Achievement Test-Revised. Wilmington, DE: Jastak Associates.

Johnson, D. J., & Myklebust, H. R. (1967). Learning disabilities: Educational principles and practices. New York: Grune & Stratton.

Johnson, D. J., & Myklebust, H. R. (1971). Learning disabilities. New York: Grune & Stratton.

Kaufman, A. S. (1994). Intelligent testing with the WISC-III. New York: John Wiley & Sons.

Keldgord, R. (1969). Brain damage and delinquency: A question and a challenge. Academic Therapy, 4, 93-99.

Kimura, D. (1987). Are men's and women's brains really different? Canadian Psychology, 28, 133-147.

Kimura, D. & Hampson, E. (1994). Cognitive pattern in men and women is influenced by fluctuations in sex hormones. Current Directions in Psychological Science, 3, 57-61.

Kirouac, G., & Dore, F. Y. (1985). Accuracy of the judgement of emotions as a funtion of sex and level of education. Journal of Nonverbal Behavior, 9, 3-7.

Klove, H. (1959). Relationship of differential electroencephalographic patterns to distribution of Wechsler-Bellevue scores. Neurology, 9, 871-876.

Klove, H. & Reitan, R. M. (1958). Effect of dysphasia and distortion on Wechsler-Bellevue results. Archives of Neurology and Psychiatry, 80, 708-713.

Kline, R. B., & Lachar, D. (1992). Evaluation of age, sex, and race bias in the Personality Inventory for Children (PIC). Psychological Assessment, 4, 333-339.

Kline, R. B., Lachar, D., & Gdowski, C. L. (1988). Convergence and concurrent validity of DSM-III diagnoses and the Personality Inventory for Children (PIC). Canadian Journal of Behavioral Science, 20, 251-264.

Klinnert, M. D., Campos, J. J., Sorce, J. G., Emde, R. N., & Svejda, M. (1983). Emotions as behavior regulators: Social referencing in infancy. In R.

Plutchik & H. Kellerman (Eds.), Emotion, theory, research, and experience: Vol. 2. (pp. 57-86). New York: Academic Press.

Krudek, L. A., & Krile, D. (1982). A developmental analysis of the relation between peer acceptance and both interpersonal understanding and perceived social self-competence. Child Development, 53, 1485-1491.

Lachar, D. (1982). Personality Inventory for Children (PIC) revised format manual supplement. Los Angeles: Western Psychological Services.

Lachar, D. (1990). Objective assessment of child and adolescent personality: The Personality Inventory for Children (PIC). In C. R. Reynolds & R. W. Kanphaus (Eds.), Handbook of psychological and educational assessment of children: Vol. 2, Personality, behavior, and context (pp. 298-323). New York: Guildford.

Lachar, D., Butkus, M., & Hryhorczuk, L. (1978). Objective personality assessment of children: An exploratory study of the Personality Inventory for Children (PIC) in a child psychiatric setting. Journal of Personality Assessment, 42, 529-537.

Lachar, D., & Gruber, C. P. (1995). A manual for the Personality Inventory for Youth (PIY): A self-report companion to the Personality Inventory for Children (PIC). Los Angeles: Western Psychological Services.

Lachar, D, & Gruber, C. P. (1994). Personality Inventory for Youth (PIY): Administration booklet, research version, Los Angelas: Western Psychological Services.

Lachar, D., & Kline, R. B. (1992). The personality inventory for children (PIC) and the personality inventory for youth (PIY). In M. Maruish (Ed.), Use of psychological testing for treatment planning and outcome assessment (chapter 15). Hillsdale NJ: Lawrence Erlbaum.

Maheady, L., & Sainato, D. M. (1986). Learning-disabled students' perceptions of social events. In S.J. Cecil (Ed.), Handbook of Cognitive, social, and neuropsychological aspects of learning disabilities (Vol. 1, pp. 381-402). Hillsdale, NJ: Lawrence Erlbaum.

Mandal, M. K., & Rai, A. (1987). Responses to facial emotion and psychopathology. Psychiatry Research, 20, 317-323.

Matarazzo, J. D. (1972). Wechsler's measurement and appraisal of adult intelligence (5th ed.). Baltimore, MD: Williams & Wilkins.

Mayo, C., & LaFrance, M. (1979). On the acqusition of nonverbal communication: A review. In S. Chess & A. Thomas (Eds.), Annual progress in child psychiatry and child development (pp. 127-153). New York: Brunner/Mazel.

McCauley, E., Ito, J., & Kay, T. (1986). Psychosocial functioning in girls with Turner syndrome and short stature. Journal of the American Academy of Child Psychiatry, 25, 105-112.

McCauley, E., Kay, T., Ito, J., & Treder, R. (1987). The Turner Syndrome: Cognitive deficits, affective discrimination, and behavior problems. Child Development, 58, 464-473.

McEwen, B. S. (1980). Gonadal steroids: humoral modulators of nerve-cell function. Mol Cell Endocrinol, 18, 151-164.

Mehrabian, A. (1968). Communication without words. Psychology Today, 24, 52-55.

Mesulam, M. M. (1985). Patterns in behavioral neuroanatomy: Association areas, the limbic system, and hemispheric specialization. In M. M. Mesulam (Ed.), Principles of behavioral neurology (pp. 1-70). Philadelphia: Davis.

Michelson, L., & Dilorenzo, T. M. (1981). Behavioral assessment of peer interaction and social functioning in institutional structured settings. Journal of Clinical Psychology, 37, 499-504.

Michigan State Board of Education. (1986, November). Revised administrative rules for special education and rules for school social worker and school psychological services, pp. 10-11.

Minskoff, E. H. (1980). Teaching approach for developing nonverbal communication skills in students with social perception deficits. Journal of Learning Disabilities, 13, 9-15.

Morgan, D. I. (1979). Prevalence and types of handicapping conditions found in juvenile correctional institutions: A national survey. Journal of Special Education, 33, 283-295.

Morris, R., Blashfield, R., & Satz, P. (1986). Developmental classification of reading-disabled children. Journal of Clinical and Experimental Neuropsychology, 8, 371-392.

Mulligan, W. A. (1969). A study of dyslexia and delinquency. Academic Therapy, 4, 117-187.

Nowicki, S., & Carton, J. (1993). The measurement of emotional intensity from facial expressions. The Journal of Social Psychology, 133, 749-750.

Nowicki, S., & Duke, M. (1989). The Diagnostic Analysis of Nonverbal Accuracy (DANVA). Atlanta, GA: Emory University.

Nowicki, S, & Duke, M. (1994). Individual differences in the nonverbal communication of affect: The diagnostic analysis of nonverbal accuracy scale. Journal of Nonverbal Behavior, 18, 9-35.

Ozols, E. J., & Rourke, B. P. (1985). Dimensions of social sensitivity in two types of learning disabled children. In B. P. Rourke (Ed.), Neuropsychology

of learning disabilities: Essentials of subtype analysis (pp. 281-301). New York: Guildford Press.

Pearl, R. (1987). Social cognitive factors in learning-disabled children's social problems. In S. J. Cecil (Ed.), Handbook of cognitive, social, and neuropsychological aspects of learning disabilities: Vol. 2. (pp. 273-294). Hillsdale, NJ: Lawrence Erlbaum.

Piers, E. V., & Harris, D. B. (1969). The Piers-Harris Children's Self-Concept Scale (The way I feel about myself). Los angeles: Western Psychological Services.

Piers, E. V. (1984). Piers-Harris Children's Self-Concept Scale. Nashville, TN: Counselor Recordings and Tests.

Piers, E. V., & Harris, D. B. (1984). Revised Manual for the the Piers-Harris Children's Self-Concept Scale. Nashville, TN: Counselor Recordings and Tests.

Porter, J. E., & Rourke, B. P. (1985). Socioemotional functioning of learning disabled children: A subtypal analysis of personality patterns. In B. P. Rourke (Ed.), Neuropsychology of learning disabilities (pp. 257-280). New York: Guildford Press.

Quay, H. C. (1986). Classification. In H. C. Quay & J. S. Werry (Eds.), Psychopathological disorders of childhood (pp. 1-34). New York: Wiley & Sons.

Reitan, R. M. (1955). Certain differential effects of left and right cerebral lesions in human adults. Journal of Comparative and Physiological Psychology, 48, 474-477.

Reske-Nielsen, E., Christensen, A. L., & Nielsen, J. (1982). A neuropathological and neuropsychological study of Turner's syndrome. Cortex, 18, 181-190.

Rosenthal, R., Hall, J. A., Archer, D., DiMatteo, M. R., & Rogers, P. L. (1979). The PONS test manual: Profile of Nonverbal Sensitivity. New York: Irvington Publishers, Inc.

Ross, E. D. (1981). The aprosodias: Functional-anatomical organization of the affective components of language in the right hemisphere. Archives of Neurology, 38, 561-569.

Ross, E. D., & Mesulam, M. M. (1979). Dominant language functions of the right hemisphere. Archives of Neurology, 36, 144-149.

Rourke, B. P. (1987). Syndrome of nonverbal learning disabilities: the final common pathway of white-matter disease/dysfunction? The Clinical Neuropsychologist, 1, 209-234.

Rourke, B. P. (1989). Nonverbal learning disabilities: The syndrome and the model. New York: Guildford Press.

Rourke, B. P. (1991). Neuropsychological validation of learning disability subtypes. New York: Guildford Press.

Rourke, B. P., & Finlayson, M. A. J. (1978). Neuropsychological significance of variations in patterns of academic performance: Verbal and visual-spatial abilities. Journal of Abnormal Child Psychology, 6, 121-133.

Rourke, B. P., & Fisk, J. L. (1981). Socio-emotional distrubances of learning disabled children: The role of central processing deficits. Bulletin of the Orton Society, 31, 77-88.

Rourke, B. P., & Fuerst, D. E. (1996). Psychosocial dimensions of learning disability subtypes. Assessment, 3, 277-290.

Rourke, B. P., Young, G. C., & Leenaars, A. A. (1989). A childhood learning disability that predisposes those afflicted to adolescent and adult depression and suicide risk. Journal of Learning Disabilities, 22, 169-175.

Rourke, B., Young, G. C., Strang, J. D., & Russell, D. L. (1985). Adult outcomes of central processing deficiencies in childhood. In I. Grant & K. M. Adams (Eds.), Neuropsychological assessment in neuropsychiatric disorders: Clinical methods and empirical findings (pp.. 244-267). New York: Oxford University Press.

Sabatino, D. A., & Mauser, A. J. (Eds.) (1978). Specialized education in today's secondary schools. Boston: Allyn & Bacon, Inc.

Saunders, C. (1996). Interparental and child-parent agreement on childhood psychopathology as assessed by the Personality Inventory for Children, second edition (PIC-R) and the Personality Inventory for Youth (PIY). Unpublished manuscript, University of Windsor, Canada.

Semrud-Clikeman, M. & Hynd, G.W. (1990). Right hemisphere dysfunction in nonverbal learning disabilities: Social, academic, and adaptive functioning in adults and children. Psychological Bulletin, 107, 196-209.

Sibitani, A. (1980). The Japanese brain: The difference between East and West may be the difference between left and right. Science, 80, 22-27.

Silverman, R. G. (1978). An investigation of self concept in urban, suburban and rural students with learning disabilities. Dissertation Abstracts International, 38, 5398A. (University Microfilms No. 78-01, 877)

Siperstein, G. N., Bopp, M. A., Bak, J. J. (1978). Social status of learning disabled children. Journal of Learning Disabilities, 11, 98-102.

Spence, S. H. (1987). The relationship between social-cognitive skills and peer sociometric status. British Journal of Developmental Psychology, 5, 347-356.

Strang, J.D., & Rourke, B.P. (1985). Adaptive behavior of children with specific arithmetic disabilities and associated neuropsychological abilities and deficits. In B.P. Rourke (Ed.), Neuropsychology of learning disabilities: Essentials of subtype analysis (pp. 302-328). New York: Guildford Press.

Tomkins, S. S., & McCarter, R. (1964). What and where are the primary affects? Some evidence for a theory. Perceptual and Motor Skills, 18, 119-158.

Vitaro, F., & Pelletier, D. (1991). Assessment of children's social problem-solving skills in hypothetical and actual conflict situations. Journal of Abnormal Child Psychology, 19, 505-518.

Voeller, K. K. S. (1986). Right hemisphere deficit syndrome in children. American Journal of Psychiatry, 143, 1004-1009.

Walden, T. A., & Field, T. M. (1982). Discrimination of facial expressions by preschool children. Child Development, 53, 1312-1319.

Walker, E. (1981). Emotion recognition in disturbed and normal children: A research note. Journal of Child Psychology and Psychiatry, 22, 263-268.

Walker, E., Marwit, S., & Emory, E. (1980). A cross-sectional study of emotion recognition in schizophrenics. Journal of Abnormal Psychology, 89, 428-436.

Wechsler, D. (1949). Wechsler Intelligence scale for Children. New York: Psychological Corporation.

Wechsler, D. (1974). Manual of the Wechsler Intelligence Scale for Children-Revised. New York: Psychological Corporation.

Wechsler, D. (1974). Manual of the Wechsler Adult Intelligence Scale-Revised. New York: Psychological Corporation.

Wechsler, D. (1981). Manual of the Wechsler Adult Intelligence Scale-Revised. New York: Psychological Corporation.

Wechsler, D. (1991). Manual for the Wechsler Intelligence Scale for Children-Third Edition. San Antonio: The Psychological Corporation.

Weintraub, S. & Mesualm, M. M. (1983). Developmental learning disabilities of the right hemisphere: Emotional, interpersonal, and cognitive components. Archives of Neurology, 40, 463-468.

Weller, C., & Strawser, S. (1987). Adaptive behavior of subtypes of learning disabled individuals. The Journal of Special Education, 21, 101-115.

Werry, J. S. (1986). Physical illness, symptoms, and allied disorders. In H. C. Quay & J. S. Werry (Eds.), Psychopathological disorders of childhood (pp. 232-293). New York: Wiley & Sons.

White, J. L., Moffitt, T. E., & Silva, P. A. (1992). Neuropsychological and socio-emotional correlates of specific-arithmetic disability. Archives of Clinical Neuropsychology, 7, 1-16.

Wiig, E.H., & Harris, S. P. (1974). Perception and interpretation of nonverbally expressed emotions by adolescents with learning disabilities. Perceptual & Motor Skills, 38, 239-245.

Wirt, R. D., Lachar, D., Klinedinst, J. K., & Seat, P. D. (1977). Multidimensional description of child personality: A manual for the Personality Inventory for Children. Los Angeles: Western Psychological Services.

Wirt, R. D., Lachar, D., Klinedinst, J. K., & Seat, P. D. (1984). Multidimensional description of child personality: A manual for the Personality Inventory for Children. Revision by David Lachar. Los Angeles: Western Psychological Services.

Wirt, R. D., Lachar, D., Seat, P. D., & Broen, W. E. (1994). PIC/2 Research Edition Administration Booklet. Los Angeles: Western Psychological Services.

Zuckerman, M., Lipsets, M. S., Koivumaki, J. H., & Rosenthal, R. (1975). Encoding and decoding of nonverbal cues of emotion. Journal of Personality and Social Psychology, 32, 1068-1076.

Zuckerman, M., & Przewuzman, S. J. (1979). Decoding and encoding facial expressions in preschool-age children. Environmental Psychology and Nonverbal Behavior, 3, 147-163.

Appendix A

R 340.1713 "Specific learning disability" defined; determination.

Rule 13.(1) "Specific learning disability" means a disorder in 1 or more of the basic psychological processes involved in understanding or in using language, spoken or written, which may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations. The term includes such conditions as perceptual handicaps, brain injury, minimal brain , dyslexia, and developmental aphasia. The term does not include children who have learning problems which are primarily the result of visual, hearing, or motor handicaps, of mental retardation, of emotional disturbance, of autism, or of environmental, cultural, or economic disadvantage.

(2) The individualized educational planning committee may determine that a child has a specific learning disability if the child does not achieve commensurate with his or her age and ability levels in 1 or more of the areas listed in this subrule, when provided with learning experiences appropriate for the child's age and ability levels, and if the multidisciplinary evaluation team finds that a child has a severe discrepancy between achievement and intellectual ability in 1 or more of the following areas:

(a) Oral expression.

(b) Listening comprehension.

(c) Written expression.

(d) Basic reading skill.

(e) Reading comprehension.

(f) Mathematics calculation.

(g) Mathematics reasoning.

(3) The individualized educational planning committee shall not identify a child as having a specific learning disability if the severe discrepancy between ability and achievement is primarily the result of any of the following:

(a) A visual, hearing, or motor handicap.

(b) Mental retardation.

(c) Emotional disturbance.

(d) Autism.

(e) Environmental, cultural, or economic disadvantage.

(4) A determination of impairment shall be based upon a comprehensive evaluation by a multidisciplinary evaluation team, which shall include at least both of the following:

(a) The child's regular teacher or, if the child does not have a regular teacher, a regular classroom teacher qualified to teach a child of his or her age or, for a child of less than school age, an individual qualified by the state educational agency to teach a child of his or her age.

(b) At least 1 person qualified to conduct individual diagnostic examinations of children, such as a school psychologist, a teacher of speech and language impaired, or a teacher consultant.

Michigan State Board of Education (1986)

Appendix B

NLD Syndrome (descriptive features)

(1) Bilateral tactile-perceptual deficits.

(2) Bilateral psychomotor coordination deficiencies.

(3) Outstanding deficiencies in visual-spatial-organizational abilities.

(4) Marked deficits in nonverbal problem-solving, concept-formation, hypothesis-testing, and the capacity to benefit from positive and negative informational feedback in novel or complex situations. Significant difficulty in dealing with cause-effect relationships and deficiencies in the appreciation of incongruities (e.g., age appropriate sensitivity to humor).

(5) Well developed rote verbal capacities and extremely well developed rote verbal memory skills.

(6) Extreme difficulty in adapting to novel and otherwise complex situations. Over-reliance on prosaic, rote (ineffective) behaviors in such situations.

(7) Outstanding relative deficiencies in mechanical arithmetic as compared to proficiencies in reading (word-recognition) and spelling.

(8) Verbosity of a repetitive, rote nature. Poor psycholinguistic pragmatics. Phonetically accurate misspellings. Little or no speech prosody. Reliance on language as a principal means for social relating, information gathering, and relief from anxiety.

(9) Significant deficits in social perception, social judgement, and social interaction skills. Tendency towards social withdrawal and social isolation as age increases. Greater risk for socio-emotional disturbance, particularly "internalized" forms of psychopathology.

Rourke (1987, p. 210)

Appendix C

Definitions of Peer Interactions

The following definitions of peer interactions adapted by Michelson and Dilorenzo (1981) were used to rate children in the free-play room setting:

Adaptive peer interaction is defined as behavior directed specifically toward another peer either through vocalizing, listening to others speak to him or her, maintaining facial attention, eye contact or cooperative physical contact (e.g., touching or passing a game object) while in the context of the game, activity, or unstructured interaction. Included in this category is behavior defined as quietly waiting for turn in activities or game. This category is coded when the child exhibits this behavior for 9 out of 10 seconds in the interval. When the child does not pay attention to the activity, such as gazing around the room, playing with another object, etc., for more than 1 second during the 10-second interval, he/she is not coded as interacting with peers.

Maladaptive peer interaction is defined as any behavior that produces a negative response from other peers, such as being aggressive or provoking, e.g., name-calling, teasing, verbal threats, ordering, bullying, taking and/or destroying the property of the others. Included in this category are assaultive behaviors such as physically striking at a peer, hitting, kicking, scratching, biting, fighting, shoving, throwing objects, spitting or tripping. If any one of these behaviors occur during the 10-second interval, regardless of duration, the interval is scored as maladaptive.

Solitary independent play is defined as playing independently with games or activities that are different from those used by the children within speaking distance and making no effort to get close to other children. He/she pursues his/her own activity without reference to what other children are doing. He/she initiates no conversation with other peers. When this behavior occurs for more than 1 second during the 10-second interval, it is coded as solitary independent play.

Response to staff is defined as interacting only with an adult, either verbally or nonverbally. This category includes any behavior directed to an adult that includes such activities as playing with an adult or talking to an adult. When this behavior occurs for more than 1 second during the 10-second interval it is coded as responding to staff. In the case that solitary independent play and response to staff occur during the same 10-second interval, the behavior that is observed for the greater length of time is coded.

Appendix D

Recording Sheet

NAME:
DATE:

	API	MPI	SIP	RSI
1				
2				
3				
4				
5				
6				

	API	MPI	SIP	RSI
1				
2				
3				
4				
5				
6				

	API	MPI	SIP	RSI
1				
2				
3				
4				
5				
6				

	API	MPI	SIP	RSI
1				
2				
3				
4				
5				
6				

Appendix E

Parental Consent Form

DATE: NAME:
DOB:

Dear_____(Parent(s)/Guardian)

Your child has been invited to participate in a research project at Hawthorn Center. The purpose of this study is to improve on ways to understand and help children in the areas of social skills and self-concept.

I am requesting permission for you, and your child, to fill out some forms. The parent questionnaire, which uses a "true" "false" format will ask about your child's behavior and take roughly 15 to 60 minutes to complete. Your child will be asked to complete a similar questionnaire about his/her own behavior and also one asking questions about how he/she feels about him/her self. Your child will also be asked to view photos of facial expressions or listen to an audio tape and requested to identify the appropriate feelings which the pictures/audio tape convey, e.g., "happy", "sad." Finally, your child's interactions with peers in a free play setting may be briefly observed by a research assistant.

This study will not in any way affect the diagnosis or treatment of your child. Your responses and those of your child will be confidential and will not be part of the hospital record. Similarly, confidentiality will be maintained should any publications result from this study. Being a part of this study is entirely voluntary! You are free to withdraw your consent, and you can discontinue your child's participation at any time by notifying the therapist or social worker. Your child is also free to discontinue participation at any time. Withdrawal from the study will have no effect on any services or treatment that your child is currently receiving from Hawthorn Center. There are no risks or inconveniences associated with this study other than your, and your child's, time in completing the questionnaire described above. Your child will receive $5 for his participation. It is hoped that this research will help in the development of improved social skill training and self-esteem building programs for children. The likelihood of a research-related injury is quite low. There is no plan for compensation or for additional treatment, other than that currently available to your child, to be provided by Hawthorn Center in case of any unforeseeable injury during the research procedure. A staff

psychologist will be available to your child to answer any questions or concerns he/she may have.

If you have any questions about your rights as a participant in this research project, you should contact Mrs. Glenina Nolte at (810) 349-3000.

Victoria Petti, M.S., LLP
Staff Psychologist - Hawthorn Center
Ph.D Candidate - University of Windsor

On the basis of the above information, I agree as parent/guardian to have my child _____ take part in this study. I have received a copy of this form.

_____ Witness _____
Parent/Guardian

_____ _____
Name (Printed) Name (Printed)

_____
Date

Consent for Subjects

Your parent(s)/guardian feels it is "OK" for you to take part in this project. All you have to do is answer some questions about the way you think and feel, look at some photos with different facial expressions, and listen to a short audiotape. Other kids who have looked at the photos and listened to the tape have described it as "fun." It will take between one and two hours to do everything. When you are finished, you will receive $5 dollars for your help and will have time to ask any questions you may have. Once you start, if you change your mind, you can stop at any time. I understand what is on this signature sheet, and I will sign below if I want to participate in this project.

_____ _____

Child's signature Witness

_____

Name (Printed)

Date_____

Parental Consent

I, _____ agree to allow my child _____ to participate in the research project which is being conducted by Victoria Petti, graduate student at the University of Windsor, under the supervision of Dr. Sylvia Voelker of the University of Windsor. I understand that this participation is entirely voluntary; I or my child can withdraw consent at any time and the results of the participation will be removed from the study. I also understand that the decision not to participate in this project will not affect services from the agency with which my child is involved.

The following points have been explained to me:

1) The purpose of the research is to increase our understanding of how children with different abilities feel about themselves and how they relate to others. This information will be shared with parents and educators to help develop self-esteem and confidence building programs for children.

2) The procedures are as follows:

a) Achievement testing (e.g., testing on the types of subjects children learn in school) may be necessary for those students who have not already had this completed at Windsor Regional Children's Centre.

b) During a one hour session, my child will view photos of facial expressions, listen to an audio tape, and name the feeling which the picture/tape convey, e.g. "happy" or "sad." My child will also complete a questionnaire about what he thinks and feels.

c) While my child is completing his/her tasks, I will complete a questionnaire describing my child's development and interests. This questionnaire will take about 30 minutes to complete.

3) There is no apparent risk of psychological harm and my child will face no discomfort or stress during this project other than the time commitment of about one hour on one occasion.

4) I understand that an identification number will be used and my child's name will not be recorded on any of the data.

5) The investigator will answer any further questions about the research, either now or during the course of the project. Parents may contact the investigator for a written summary of the results once they are available.

_____
Parent Signature (Date)

_____
Parent Signature (Date)

_____
Child Signature (Date)

_____
Witness (Date)

PLEASE SIGN BOTH COPIES. KEEP ONE AND RETURN THE OTHER TO THE INVESTIGATOR

Research at the University of Windsor which involves human participants is conducted under the auspices of the University Ethics Review Committee and the Research Evaluation Committee of the Windsor Regional Children's Centre. Questions or problems regarding this project can be addressed to Victoria Petti, (810-349-3000, ext 516), Dr. Sylvia Voelker (252-4232, ext 2249), Ethics Committee, University of Windsor, or Ms. Kathy Rene (257-5219), Windsor Regional Children's Centre.

Appendix F

Instructions for Personality Inventory for Children/2 Research Edition

The measure is completed by a parent or guardian who is provided an administration booklet and answer sheet with the following written instructions on the PIC/2 booklet:

This questionnaire contains statements that will allow you to describe your child's feelings, behavior, and family relationships. First fill in the information requested on the answer sheet; then read each statement in this booklet and decide whether it is true or false for your child.

Appendix G

Instructions for the Piers-Harris Children's Self-Concept Scale

The experimenter began by reading the following directions from the Piers-Harris booklet aloud: "Here is a set of statements that tell how some people feel about themselves. Read each statement and decide whether or not it describes the way you feel about yourself. If it is *true* or *mostly true* for you, circle the word 'yes' next to the statement. If it is *false* or *mostly false* for you, circle the word 'no.' Answer every question, even if some are hard to decide. Do not circle both 'yes' and 'no' for the same statement.

Remember that there are no right or wrong answers. Only you can tell us how you feel about yourself, so we hope you will mark the way you really feel inside."

Appendix H

Instructions for DANVA Receptive Subtests

General Directions

When the subject was seated a booklet of photographs was placed in front of the child. After giving the specific instructions noted below, the subject was presented with each photograph for a five second interval before taking the booklet away. The responses subjects gave were marked on an answer sheet by the administrator. Photographs were presented one by one until all adult and child photographs had been viewed.

Facial Expressions Subtest

Photographs of 24 adult and 24 child faces were used for this subtest. The following specific instructions were given to children:

"I am going to show you pictures of some people's faces and I want you to tell me if they are feeling happy, sad, angry, or fearful."

Children were first shown photographs of adult faces and asked, "Is this person feeling happy, sad, angry, or fearful." (whatever response the child gave was accepted with the following comment, "Good.")

Following presentation of photographs of adults, the children were shown photographs of children and the following directions were given:

"Now we are going to look at pictures of children's faces and I want you to tell me if these children are feeling happy, sad, angry, or fearful."

Receptive Postures Test

Photographs of 12 different postures were used for this subtest. The following specific instructions were given:

"I am going to show you a picture of a person who is standing different ways and I want you to tell me how that person is feeling just by the way she/he is standing. Is that person feeling happy, sad, angry, or fearful (afraid)?"

Receptive Gestures Subtest

Photographs of 12 different gestures were used for this subtest. The following instructions were given:

"I am going to show you pictures of people who are using their hands and arms to communicate how they feel. I want you to tell me how that person is feeling just by looking at her/his hands and arms. Is that person feeling happy, sad, angry, or fearful (afraid)?"

Receptive Paralanguage Subtest (adult and child)

An audiotape of adult voices and an audio tape player was used for this subtest. The same sentence is repeated 24 times on the tape. The loudness may vary with each trial and is part of the information regarding the emotion being communicated. The following specific instructions were given:

"I am going to play an audio tape in which you will hear someone say the sentence, 'I am going out of the room now but I will be back later.' I want you to listen to the sentence being spoken and tell me if the person saying the sentence is feeling happy, sad, angry, or fearful (afraid)."

An audiotape of child voices was used for the child receptive paralanguage test which repeats the same sentence 16 times. The following instructions were given:

"I am going to play an audio tape in which you will hear someone say the sentence, 'I am going out of the room now but I will be back later.' I want you to listen to the sentence being spoken and tell me if the person saying the sentence is feeling happy, sad, angry, or fearful (afraid)."

Appendix I

Instructions for Personality Inventory for Youth

Instructions were read to each child as were the 270 descriptive statements of the PIY. The child marked the space labeled "T" on a separate answer sheet if it was true or mostly true, and "F" if the statement being read was false or not usually true. The written statements in booklet format were also provided for each child to look at. The following directions from the PIY booklet were read aloud:

"This booklet contains statements that will allow you to describe your feelings, behavior, and family. Mark your answers on the separate answer sheet. Read each statement in this booklet and decide whether it is true or false for you."

Appendix J

Supplementary Tables

Table J1

Analysis of Variance Summary Table for the Sum of Responses on the Adult Faces, Child Faces, Adult Listening, and Child Listening Diagnostic Analysis of Nonverbal Accuracy Subtests

Effect	df	F Value
	Between Subjects	
Group	2	2.74
	Within Subjects	
Status	1	189.45*
Status x Group	2	.77
Modality	1	.14
Modality x Group	2	.19
Status x Modality	1	86.82*
Status x Modality x Group	2	1.05

*$p < .0001$.

Table J2

Analysis of Variance Summary Table for the Sum of Accurately Identified Emotions on the Diagnostic Analysis of Nonverbal Accuracy Adult Faces Receptive Test

Effect	df	F Value
	Between Subjects	
Group	2	3.95*
	Within Subjects	
Emotion	3	13.84**
Emotion x Group	6	1.13

*$p < .05$. **$p < .0001$.

Table J3

Analysis of Variance Summary Table for the Sum of Accurately Identified Emotions on the Diagnostic Analysis of Nonverbal Accuracy Child Faces Receptive Test

Effect	df	F Value
	Between Subjects	
Group	2	2.74
	Within Subjects	
Emotion	3	10.93*
Emotion x Group	6	.91

*p < .0001.

Table J4

Analysis of Variance Summary Table for the Sum of Accurately Identified Emotions on the Diagnostic Analysis of Nonverbal Accuracy Receptive Postures Test

Effect	df	F Value
	Between Subjects	
Group	2	.01
	Within Subjects	
Emotion	3	6.62*
Emotion x Group	6	.57

*$p < .0001$.

Table J5

Analysis of Variance Summary Table for the Sum of Accurately Identified Emotions on the Diagnostic Analysis of Nonverbal Accuracy Receptive Gestures Test

Effect	df	F Value
	Between Subjects	
Group	2	4.30*
	Within Subjects	
Emotion	3	94.69**
Emotion x Group	6	1.48

*$p < .05$. **$p < .0001$.

Table J6

Analysis of Variance Summary Table for the Sum of Accurately Identified Emotions on the Diagnostic Analysis of Nonverbal Accuracy Adult Voices Test

Effect	df	F Value
	Between Subjects	
Group	2	2.26
	Within Subjects	
Emotion	3	5.62*
Emotion x Group	6	.42

*$p < .001$.

Table J7

Analysis of Variance Summary Table for the Sum of Accurately Identified Emotions on the Diagnostic Analysis of Nonverbal Accuracy Child Voices Test

Effect	df	F Value
	Between Subjects	
Group	2	.10
	Within Subjects	
Emotion	3	19.14*
Emotion x Group	6	.29

*$p < .0001$.

Table J8

Percentage of Affect of Error (column) by Affect of Stimuli Presented (Row) on Adult Faces Subtest for NLD, VLD, and Control Group Children

Emotion	1	2	3	4
		NLD (n = 11)		
1. Happy	--	2.59	9.09	12.98
2. Sad	6.49	--	11.68	6.49
3. Angry	2.59	12.98	--	7.79
4. Fearful	1.29	12.98	12.98	--
		VLD (n = 11)		
1. Happy	--	4.68	23.43	18.75
2. Sad	3.12	--	4.68	1.56
3. Angry	0	9.37	--	7.81
4. Fearful	4.68	10.93	10.93	--
		Con (n = 11)		
1. Happy	--	0	19.60	9.80
2. Sad	13.72	--	11.76	7.84
3. Angry	1.95	17.64	--	3.92
4. Fearful	0	7.84	5.88	--

Table J9

Percentage of Affect of Error (column) by Affect of Stimuli Presented (Row) on Child Faces Subtest for NLD, VLD, and Control Group Children

Emotion	1	2	3	4
		NLD (n = 11)		
1. Happy	--	0	4.0	18.0
2. Sad	0	--	20.0	10.0
3. Angry	2.0	10.0	--	4.0
4. Fearful	6.0	4.0	22.0	--
		VLD (n = 11)		
1. Happy	--	0	10.25	28.2
2. Sad	2.56	--	25.64	0
3. Angry	2.56	2.56	--	5.12
4. Fearful	0	5.12	17.94	--
		Con (n = 11)		
1. Happy	--	0	4.34	26.08
2. Sad	0	--	21.23	4.34
3. Angry	0	8.69	--	0
4. Fearful	4.34	17.39	13.04	--

Table J10

Percentage of Affect of Error (column) by Affect of Stimuli Presented (Row) on Adult Voices Subtest for NLD, VLD, and Control Group Children

Emotion	1	2	3	4
		NLD (n = 11)		
1. Happy	--	3.88	1.94	0
2. Sad	5.82	--	8.73	27.18
3. Angry	14.56	3.88	--	2.91
4. Fearful	8.73	19.41	2.91	--
		VLD (n = 11)		
1. Happy	--	4.65	4.65	1.16
2. Sad	9.30	--	10.46	23.25
3. Angry	10.46	4.65	--	6.97
4. Fearful	4.65	15.11	4.65	--
		Con (n = 11)		
1. Happy	--	2.38	0	0
2. Sad	2.38	--	10.71	28.57
3. Angry	20.23	9.52	--	1.19
4. Fearful	7.14	14.28	3.57	--

Table J11

One-Way Analysis of Variance Summary Table for the Effect of Group on Piers-Harris Cluster and Total Piers-Harris Scores

Effect	Dependent Variable	Univariate F (2, 30)
Group	Behavior	1.37
	Intellectual/School Status	.39
	Physical Appearance/Attributes	.23
	Anxiety	2.58
	Popularity	.06
	Happiness/Satisfaction	.05
	Total Piers-Harris	.54

Table J12

DSM-IV Diagnosis and Frequency Assigned by Group

Group	Diagnosis	f
NLD	Oppositional Defiant Disorder	1
	Attention Deficit-Hyperactivity Disorder	4
	Depressive Disorder NOS	1
	Major Depressive Disorder	2
	Dysthymia	1
	Psychosis NOS	1
	Tourettes	1
VLD	Oppositional Defiant Disorder	7
	Conduct Disorder Childhood Onset	1
	Attention Deficit-Hyperactivity Disorder	1
	Dysthymia	2
Control	Oppositional Defiant Disorder	2
	Conduct Disorder	3
	Anxiety Disorder NOS	2
	Dysthymia	1
	Major Depressive Disorder	2
	Psychosis NOS	1

Note. NOS = Not otherwise specified.

Table J13

Intercorrelations Between Personality Inventory for Children - Revised and Personality Inventory for Youth Subscales

Subscale	PIY								
PIC-R	COG	DIS	WDL	RLT	SSK	DLQ	ADH	FAM	SOM
ACH	**.56****	.06	.13	.28	.01	.13	.18	-.01	.17
IS-S	**.40****	-.14	-.17	-.08	-.13	.09	-.05	-.08	-.14
DVL	**.60****	.03	.16	.21	.17	.08	.15	.04	.08
D	.06	.26	.29	.27	.29	.02	.06	-.04	.23
ANX	-.09	.22	**.35***	.06	.28	-.10	-.11	-.06	.18
WDL	-.00	.02	**.39***	.19	**.38***	-.27	-.06	-.27	.22
PSY	-.00	-.01	.07	.21	.06	-.17	-.10	-.30	.24
SSK	.10	-.02	.11	**.40***	.16	-.08	.11	-.18	.23
DLQ	.07	**.48****	.23	.29	-.00	**.66****	.29	**.36***	.01
HPR	.01	**.34***	-.10	.24	-.17	**.44****	.23	.32	.12
FAM[a]									
SOM	.32	.16	.18	.29	.16	-.29	-.09	-.26	**.38***

Note. PIC-R Subscales: Achievement (ACH), Intellectual Screening (IS), Development (DVL), Depression (D), Anxiety (ANX), Withdrawal (WDL), Psychosis (PSY), Social Skills (SSK), Delinquency (DLQ), Hyperactivity (HPR), Family Relations (FAM), Somatic Concerns (SOM). PIY Subscales: Cognitive Impairment (COG), Psychological Discomfort (DIS), Withdrawal (WDL), Reality Distortion (RLT), Social Skills Deficit (SSK), Delinquency (DLQ), Impulsivity and Distractibility (ADH), Family Dysfunction (FAM), Somatic Concern (SOM).

[a]Family subscale not computed due to incomplete data.

*p <.05. **p < .001.

Table J14

Analysis of Variance Summary Table for the Mean of Four Peer Interaction Behaviors Observed in a Free-Play Setting

Effect	Dependent Variable	F Value (2, 14)
Group	Adaptive Peer Interaction	3.43
	Maladaptive Peer Interaction	.78
	Solitary Independent Play	4.71*
	Response to Staff	1.90

*$p < .05$.

VITA AUCTORIS

1969: Graduated from Dominican High School, Detroit, MI.

1973: Bachelor of Arts Degree, cum laude, from Eastern Michigan University, Ypsilanti, MI.

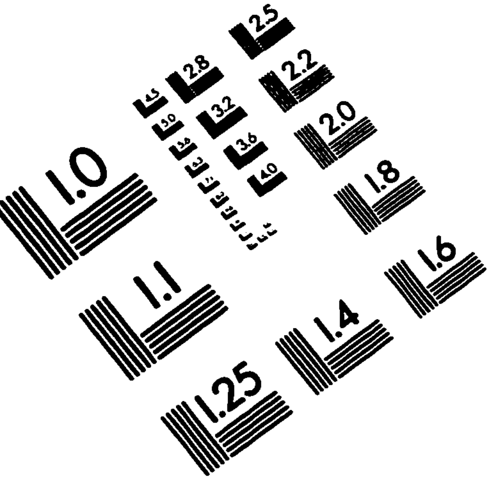
1983: Graduated with the degree of Master of Science (Clinical Psychology) from Eastern Michigan University, Ypsilanti, MI.

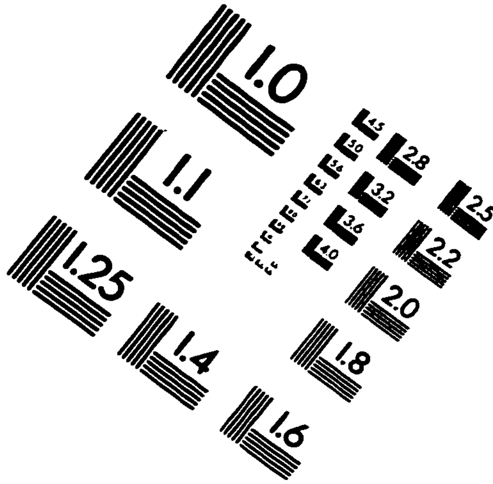
1997: Completed Doctoral degree in January 1997.

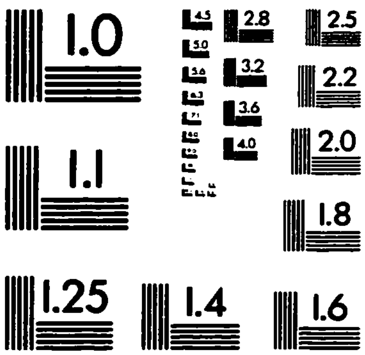
1997: Poster session presented (In Vivo Peer Interaction Skills of Children with Nonverbal Learning Disabilities) for the International Neuropsychological Society Twenty Fifth Annual Meeting (February), Orlando, Florida.

1997: Petti, V., & Voelker, S. (1997). In Vivo peer interaction skills of children with nonverbal learning disabilities. Journal of the International Neuropsychological Society, 3, 41.

IMAGE EVALUATION TEST TARGET (QA-3)







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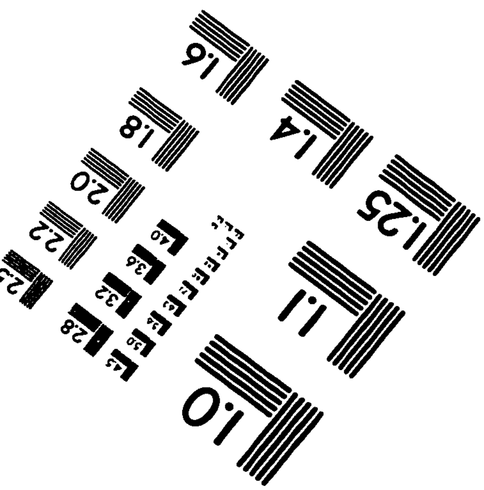

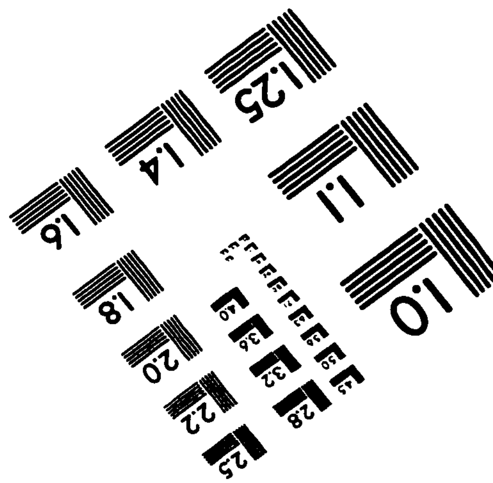

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