

Psychosocial Adjustment, Emotion Understanding, and Emotion Regulation in Young
Children with Nonverbal Learning Disabilities

by

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Abstract

This study compared 10 children between the ages of six and nine identified as having Nonverbal Learning Disabilities (NLD) and ten normally achieving controls in terms of their psychosocial functioning, emotion understanding, and emotion regulation. Parents completed scales assessing participants' level of social, emotional, and behavioural competence, and emotion regulation. Children's recognition of basic emotions (happiness, sadness, anger, and fearfulness) was assessed through nonverbal channels (pictures of facial expressions, postures, and tone of voice). Children's understanding of simultaneously experiencing two conflicting emotions (mixed emotions) and ways to express emotions (display rules) were assessed through vignettes that depicted social situations. The results indicated that parents of children with NLD, compared to children without NLD, rated their children significantly higher on scales of internalizing (i.e., Affective and Anxiety Problems) and externalizing (i.e., Attention/Hyperactivity and Oppositional Defiant Disorder Problems) difficulties, and significantly lower on a scale of emotion regulation. Compared to children without NLD, children with NLD were significantly less accurate in identifying happiness through facial expression, but not through tone of voice or posture. On the vignettes, children with NLD demonstrated significantly poorer performance on identifying mixed emotions, but not display rules, compared to children without NLD. These results help to delineate the psychosocial profile of young children with nonverbal learning disabilities.

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Introduction

Clinical reports point to psychosocial difficulties among children with Nonverbal Learning Disabilities (NLD), however, very few studies have examined these areas. Research on NLD has focused on language and neuropsychological functioning, rather than examining behavioural presentations of children with NLD (Scheeringa, 2001). When aspects of social and emotional functioning are addressed in the area of NLD, they are typically incorporated in selection criteria for research participants and are not a focus of the study itself (e.g., Dorfman, 2000; Gross-Tsur, Shalev, Manor, & Amir, 1995). Furthermore, research addressing children with NLD has neglected younger children (e.g., Antshel & Khan, 2008; Petti, Voelker, Shore, & Hayman-Abello, 2003). With the aim to contribute to the literature by complementing clinical reports with evidence, this study examined emotion understanding, emotion regulation, and psychosocial functioning in younger children (six to nine years of age) with and without NLD. Children's emotion understanding and emotion regulation were included because these skills have been shown to be related to psychosocial competence.

The social and emotional functioning of young children with NLD were explored within a framework of normative developmental functioning. As discussed by Mash and Dozois (2003), "no theory of childhood disorder is complete if it cannot be linked with a theory of how the underlying normal abilities develop and produce a disordered state" (p. 19). As a result, the use of a normative developmental framework allowed for a more informed exploration of difficulties experienced by young children with NLD in the areas of social and emotional functioning.

In this introduction section, first an overview of NLD and psychosocial adjustment in children with NLD is given. Next, a detailed overview of the development of emotions and

emotion regulation, and the importance of emotion understanding and emotion regulation for psychosocial functioning is provided from a developmental perspective, followed by specific hypotheses and objectives of the study. The rest of the thesis includes method, results, and discussion sections, with the tables presented at the end as appendices.

Nonverbal Learning Disability and Psychosocial Adjustment

Nonverbal Learning Disability (NLD) manifests itself in the form of neuropsychological and cognitive processing deficits in multiple areas, including tactile-perception, psychomotor coordination, and visual-spatial organization (Hardanek & Rourke, 1994; Rourke, 1987, 1988, 1995). It has been reported that Individuals with NLD have strengths in the areas of auditory perception, attention and memory, particularly for verbal information (Rourke et al., 2002). In addition, children with NLD show well-developed rote verbal capabilities and rote verbal memory skills (Rourke, 1987).

Although NLD is not listed in the Diagnostic and Statistical Manual for Mental Disorders, including the newest edition (DSM-IV-TR; American Psychiatric Association (APA), 2000), and some researchers (e.g., Tuller, Jantzen, Olvera, Steinberg, & Kelso, 2007) contend that NLD “is a syndrome without widely accepted diagnostic criteria or cutoffs to differentiate it from other, similar syndromes” (p. 349), such as Asperger’s syndrome, identification of NLD is based on clinical and research-based evidence, rather than on the DSM-IV. Despite similarities between NLD and Asperger’s syndrome, such as a higher intellectual functioning in the verbal domain and a lower functioning in the nonverbal domain (Tuller et al., 2007), important distinctions between Asperger’s syndrome and NLD exist. For example, according to the DSM-IV-TR (APA, 2000), one of the criteria for a diagnosis of Asperger’s syndrome includes narrow,

exclusive, and abnormal interests, which is not a defining feature of NLD (Mamen, 2007).

According to Mamen (2007):

Based on several decades of consistent research, there is a common understanding within the disciplines of psychology, neurology, occupational therapy, speech-language pathology, and education as to what constitutes a learning disability. Many nonverbal psychological processes are clearly defined, quantifiable, and valid. Given an appropriate assessment that produces relevant data, there should therefore be no reason why a diagnosis of NLD cannot be reliably formulated and communicated. (pp. 34 – 35)

The deficits associated with NLD impact academic and social and emotional functioning in children (Casey, Rourke, & Picard, 1991; Hardanek & Rourke, 2005; Rourke, 1987, 1988, 1995). In terms of psychosocial functioning, children with NLD are described as having difficulties with social perception, social judgment, and social interaction skills (Rourke, 1987; Semrud-Clikeman, 2007). For example, Rourke (1988) has proposed that the perceptual deficits found in children with NLD, such as difficulties in identifying facial expressions and tone of voice, hinder their ability to build appropriate social skills. While these studies suggest that children with NLD experience psychosocial adjustment difficulties, the exclusion of a typically developing control group in many studies makes it difficult to determine if the levels of psychosocial adjustment difficulties experienced by children with NLD are of a greater significance compared to children who do not experience learning difficulties (Little, 1993).

Emotions

Emotions involve “multi-component responses to challenges or opportunities that are important to the individual’s goals, particularly social ones” (Oatley, Keltner, & Jenkins, 2006, p. 29). The elements of emotion consist of expressive reactions (e.g., smiling and grinding one’s teeth), physiological responses (e.g., tears and heart rate increases), instrumental behaviours (e.g., seeking comfort from a caregiver), and cognitions (e.g., thoughts of anger when one

experiences a transgression) (Cornelius, 1996). Individuals communicate most of their emotions by means of words, a variety of other sounds, facial expressions, and gestures.

Some disagreement exists among researchers with regards to how many emotions, which emotions, and why certain emotions should be considered basic or fundamental (Ortony & Turner, 1990). For instance, while Oatley and Johnson-Laird (1987) stated that there are five basic emotions (anger, disgust, anxiety, happiness, and sadness), Izard (1991) proposed the existence of eight basic emotions (interest, enjoyment, surprise, sadness, anger, disgust, contempt, and fear). On the basis of information yielded from research, Johnson and Multhaup (1992) noted that basic emotions are:

thought to be evolutionarily old (Ekman, 1984), appear early in an individual's development (Lewis, Sullivan, Stanger, & Weiss, 1989), arise quickly and "automatically" (Berkowitz, 1990), are expressed in universally recognizable configurations of facial movements (Ekman, 1973), are correlated with differentiable autonomic system activity (Ekman, Levenson, & Friesen, 1983), may show subcortical conditioning (LeDoux, in press), may be predisposed to certain stimuli (Öhman, Duimberg, & Öst, 1985), and serve fundamental motivational functions within the individual and communication functions among a social group (Izard, 1977; Plutchik, 1980; Tomkins, 1963). (p. 42)

Complex emotions have also been categorized by researchers. Johnson and Multhaup (1992) noted that, in contrast to basic emotions, complex emotions are:

more recent evolutionarily, appear later in development, arise relatively slowly and seem "constructed," may be difficult to read on other people's faces or from other nonverbal cues, may share autonomic patterns with other emotions, are likely to involve cortical processing, may be associated with a wide range of stimuli including abstract concepts (e.g., patriotic feelings towards the concept of one's country), may underlie complex motivation within the individual, and may contribute much of the nuance of our social environment. (p. 42)

An example of a model that categorizes both basic and complex emotions is Plutchik's (1984) psychoevolutionary theory of emotions. Here, basic emotions can be combined to produce

complex emotions (Cornelius, 1996). For instance, love, a complex emotion, can be seen as a combination of two basic emotions (i.e., joy and acceptance).

Nonverbal communication is involved whenever one is sending (encoding) or receiving (decoding) messages within one or more of visual, auditory, tactile, smell, taste, vocalizations, facial expressions, gestures, nodding, activity level of the body, and position/distance modalities (Dil, 1984). One's level of nonverbal decoding skill depends on the sensitivity and accuracy of the receiver in interpreting the nonverbal cues of others (Riggio, 2006). Furthermore, successful nonverbal encoding requires the accurate sending of nonverbal messages to others (Riggio, 2006). Emotion processing requires understanding of nonverbal cues, such as body language and tone of voice; however, it also requires language in terms of verbal expression of emotions (Pons, Lawson, Harris, & de Rosnay, 2003).

The Development of Emotion Understanding in Children. Emotion understanding is defined as “conscious knowledge about emotion processes (e.g., emotion states and emotion regulation) or beliefs about how emotions work” (Southam-Gerow & Kendall, 2002, p. 200). Children's emotion understanding can be split up into nine areas (Pons, Harris, & de Rosnay, 2004). According to Pons and his colleagues (2004), these nine areas of emotion understanding are: (1) *recognition*, which refers to the recognition of emotions through facial expressions; (2) *external cause*, which refers to the understanding how external factors can influence the emotions of others, such as the joy that one experiences when receiving a gift; (3) *desire*, which refers to the understanding of how emotional outcomes are influenced by one's desires, such as the understanding that two individuals can feel dissimilar emotions in the same situation because they have different desires; (4) *belief*, which refers to realizing how an individual's beliefs directly impact his or her emotional reactions to a situation; (5) *reminder*, which refers to

recognizing the relationship between memory and emotion; (6) *regulation*, which refers to understanding behavioural or psychological strategies to regulate emotion; (7) *hiding*, which refers to realizing that there can be a discrepancy between inward and outward displays of emotion; (8) *mixed*, which refers to understanding how a situation can simultaneously evoke more than one emotion, even emotions of opposing valence; and (9) *morality*, which refers to understanding how positive and negative emotions result from morally acceptable and unacceptable behaviours. Children were found to gain increased levels of mastery with each of these components through the ages of three to eleven (Pons et al., 2004). Pons and his colleagues (2003) noted a similar improvement in these skills among children between the ages of four and eleven. However, within these areas, improvement is not uniform across children (Pons et al., 2003; Pons & Harris, 2005). Pons and his colleagues (2003) found that age and language ability explained 20% and 27% of the variance for emotion understanding, respectively. When age and language ability were combined, 72% this variance was explained. Therefore, age and language ability both play an important role in the development of emotion understanding. In the study by Pons and Harris (2005), the researchers found that these individual differences, for both simple and complex emotion understanding, remained stable over a one year period. Children with NLD have average or above average levels of language ability. However, as discussed by Rourke (1988), there are a number of perceptual deficits associated with NLD, such as difficulties in identifying facial expressions and tone of voice. These aforementioned perceptual deficits may impact one important area of emotion understanding, namely, the ability to recognize and label emotions. As such, the perceptual deficits associated with NLD may impede the development of important aspects of emotion understanding.

Pons and his colleagues (2004) found correlations among the nine components, indicating that particular components could be grouped into distinct stages of development. According to Pons and his colleagues, stage one begins around the age of five. Here, children are adept in their ability to recognize emotional expressions (recognition), to identify how external factors can influence emotions (external cause), and to understand the relationship between memory and emotions, such as the understanding that the intensity of an emotion decreases with time (reminder). During stage two, which develops around age seven, children begin to understand the role of beliefs and desires in shaping emotions (desire and belief, respectively), and develop the ability to hide emotions (hiding). Finally, at stage three, which occurs between nine to eleven years of age, children begin to understand more complex components of emotion understanding: the experience of mixed emotions (mixed), the regulation of emotion with cognitive strategies (regulation), and the impact of morality on the experience of emotions, such as the understanding that feelings of guilt can result from engaging in a morally unacceptable behaviour (e.g., stealing and lying) (morality). It is important to note that some aspects of emotion understanding have been evidenced at younger ages than suggested by Pons and his colleagues. For instance, children as young as age five to show some understanding of that the emotion displayed on one's face may differ from his or her underlying emotion (Misailidi, 2006). As a result, the stages at which aspects of emotion understanding develop may occur earlier than suggested by Pons and his colleagues.

Some aspects of emotion understanding among children with NLD have been examined in research. Petti and her colleagues (2003) assessed one component of emotion understanding – the ability to recognize (decode) nonverbal emotion cues – in children with NLD, aged 9 to 14 years. The revised Diagnostic Analysis of Nonverbal Accuracy (DANVA-2) was used in the

study to provide a measure of each child's ability to transmit and interpret nonverbal cues within the four basic emotions: happiness, sadness, anger and fearfulness. Subtests of the DANVA-2 measure children's ability to assess these emotions through facial expressions, gestures, postures and vocal qualities. Compared to controls, participants with NLD were found to be less accurate in assessing low intensity facial expressions on the DANVA-2. Furthermore, although no significant differences were found between participants with NLD and controls on the subtests of the DANVA-2 (i.e., gestures, postures, and vocal qualities), overall, participants with NLD were found to make more errors in their accuracy compared to controls.

A recent study by Bloom and Heath (2010) examined the recognition, expression, and the ability to understand facial expressions of emotion among adolescents (aged 12 to 16 years of age) with symptoms of NLD, general learning disabilities, and without a learning disability. Results of the study indicated that adolescents with a general learning disability were significantly less accurate at recognizing and understanding facial expressions of emotions compared to children with NLD and children without a learning disability. No significant differences were found between three groups with regards to expressing emotions. It is important to note that in this study, the researchers did not include important defining criteria to classify participants in the NLD group, such as the specification of certain scores on the verbal and performance indexes on a measure of cognitive ability. As a result, the lack of criteria that adequately defines participants within the NLD group makes it difficult to ascertain whether the results obtained in this study are truly reflective of the nonverbal emotion decoding ability of adolescents with NLD.

In the current study, the following components of emotion understanding were explored in children with NLD and a normally achieving comparison group: recognition of nonverbal

communication, mixed emotion, and display rule knowledge. The current study will focus on the ability to recognize emotion (decode) through facial expressions, gestures, and paralinguistic (i.e., vocal qualities, such as tone of voice). Mixed emotion knowledge refers to the understanding that multiple emotions can be experienced simultaneously or close together in time (Saarni, 1999). Multiple emotions are experienced when different aspects of the situation or individuals involved are considered.

Display rule knowledge is reflected in the “hiding” component of emotion understanding discussed previously, and can be defined as “socially appropriate emotional responses to a given situation” (McDowell & Parke, 2000, p. 41). As such, display rules act to guide the expression of emotion when interacting with individuals or in certain situations (Oatley et al., 2006). How display rules are internalized and expressed are influenced by a variety of additional factors, such as culture, gender, and family background (Ekman & Friesen, 1975; as cited in Maltesa & Haviland, 1982). For instance, individuals may have certain “personal display rules” which influence their expressions of emotions in certain situations. Display rule knowledge also involves the skills to inhibit or control expression of certain emotions if they are not socially appropriate, such as hiding one’s anger. One of the reasons for controlling emotions can be expectation of negative social interactions if the true emotion is displayed (Parker et al., 2001; Zeman & Garber, 1996). According to Ekman and Friesen (1969; as cited in Saarni, 1979), display rules can be grouped into the following four categories: (1) intensification of an emotional display, for example, smiling when receiving an undesirable gift since the gift giver expects us to be pleased and because it is socially appropriate to show joy when receiving a gift, (2) minimization of an emotional display, for instance, diminishing the outward expression of joy when winning a game against a competitor for socially appropriate reasons, (3) neutralization

of a facial expression, for example, not showing emotion on one's face when receiving criticism from a superior in a workplace or school setting, and (4) substitution of one emotional expression with another, for instance, the experience of anger towards an individual in a subordinate position relative to one's own may be expressed in a gritted smile.

According to the stages of emotion understanding development proposed by Pons and his colleagues (2004), the growth of mixed emotion and display rule knowledge in children occurs at older ages rather than younger ages. Harris (1989) stipulates that the development of display rule knowledge and mixed emotion knowledge occurs through stages. In the case of display rule knowledge, children first learn to hide their true feelings in particular situations around the ages of three to four. However, children tend to do this in an automatic fashion rather than using it as an intentional strategy. In addition, children at this age do not appear to appreciate the distinction between true and apparent emotion. Therefore, young children's ability to use display rules appears to precede their acknowledgement and understanding of this type of emotion understanding (Josephs, 1994). The distinction between true and apparent emotion is acknowledged in children between the ages of six to ten. Research assessing this type of emotion knowledge has demonstrated that children in this age group have a firm understanding of the fact that an emotion expressed on an individual's face may be discrepant from his or her underlying emotion (Harris, Donnelly, Guz, & Pitt-Watson, 1986). Children as young as age five have also been found to show this understanding (Misailidi, 2006). Overall, research has found that older children are more accurate at identifying display rules (Josephs, 1994), able to spontaneously produce examples of display rules, and demonstrate a greater level of complexity in their reasoning about this type of emotion knowledge compared to younger children (Saarni, 1979).

With regards to mixed emotions, Ainsworth, Blehar, Waters, and Wall (1978) showed that very young children demonstrated patterns of multiple and conflicting simultaneous emotions in response to a caregiver. This finding revealed that very young children possess the ability to express mixed emotions. Despite their ability to express mixed emotions at young ages, children's acknowledgement and understanding of these emotions develops later. Research has shown that children, at about four to five years of age, typically deny the possibility of experiencing two emotions simultaneously or close together in time when asked to generate situations that provoke multiple emotions (Harter & Buddin, 1987). For example, a child who does not have this understanding developed yet might say, "It's hard to think of this feeling and that feeling cause you only have one mind!" (Harter, 1983, p. 164). However, Kestenbaum and Gelman (1995) have shown that children between the ages of four and five can acknowledge mixed emotions in facial expressions. Therefore, young children may show a rudimentary understanding of mixed emotions when studied with less complex measures.

The development of children's understanding of mixed emotions can be explained in four stages (Harris, 1989). Between the ages of six to eight, children are able to describe emotions in a temporal sequence (Harter, 1983). For instance, a child describing two feelings occurring close together in time might say, "I would be sad if my friends wouldn't play with me but then if my mommy gave me a toy I'd be happy" (Harter, 1983, p. 164). Children start to describe different targets (i.e., objects, situations, or persons) which evoke multiple emotions around the age of seven or eight (Harris, 1989). Here, children state that it is possible to experience two emotions of similar valence (either positive or negative) at the same time. For example, a child describing two emotions of similar valence directed at different situations might say, "I'd be mad if she took one of my rings and sad if she broke one of my pictures" (Harter & Buddin, 1987, p. 392).

Preliminary acknowledgement of the possibility of experiencing emotions of conflicting valence occurs for children around age ten. Here, children “describe situations that involve two separate but concurrent situations” (Harris, 1989, p. 111). For instance, a child who has reached this stage might say, “I was sitting in school feeling worried about all the responsibilities of a new pet, but I was happy that I got straight As on my report card” (Harter & Buddin, 1987, p. 393). At age eleven, children are finally able to describe multiple emotions caused by one object, situation, or person. For example, a child in this final stage might say, “If a stranger offered you some candy, you would be eager for the candy but doubtful if it was OK” (Harter & Buddin, 1983, p. 393). Research by Wintre and Vallance (1994) has found a similar developmental sequence, but occurring at younger ages than initially proposed by Harter. Here, children were found to start this developmental sequence at about age five and demonstrated the most complex understanding of mixed emotions at around age eight. Denham (1998) suggests that procedure utilized by Wintre and Vallance (e.g., the use of an abacus-apparatus for children to rank the presence and intensity of emotions) may have made it easier for children at younger ages to communicate their understanding of mixed emotions. Research has shown that older children have better conceptualizations of mixed emotions and also have a greater likelihood of experiencing them as well in emotionally complex situations compared to younger children (Larsen, To, & Fireman, 2007).

The ability to decode facial expressions is an important developmental task which begins in infancy and continues into adulthood (Feldman & Tyler, 2006). Children begin to identify differences between facial expressions between three and seven months of age (Kopp & Neufeld, 2003). However, this ability differs by the type of facial expression observed. For instance, at three months of age, infants are able to discriminate between some facial expressions, such as

happy from surprised faces (Young-Browne, Rosenfeld, & Horowitz, 1977). However, these infants cannot consistently discriminate between sad from happy faces, and show no evidence of differentiating happy from sad faces. Around the age of one, infants decode facial expressions in more complex ways through the use of social referencing, where they search the facial expressions of adults in order to judge a situation and appropriately regulate their behaviour (Feldman & Tyler, 2006). For instance, an infant may avoid a novel toy if his or her mother exhibits a fearful expression towards this toy.

Young children further develop their facial expression decoding abilities during the preschool years. According to Feldman and Tyler (2006), “by preschool, children match facial expressions of emotion to narrated stories and label facial displays with basic emotions (i.e., happiness, sadness, anger, and fear) at better than chance accuracy” (p. 183). Between the ages of three to ten, children’s ability to accurately identify of emotions in facial expressions increases (Harrigan, 1984). By age ten, children’s level of accuracy in identifying facial expressions is near adults’ (Feldman & Tyler, 2006).

Children’s level of accuracy also varies by the emotion they are labelling. Harrigan (1984) found that the emotions of happiness, sadness, and anger are more easily recognized compared to fear, disgust, and surprise, particularly among younger children. In addition, the speed to which emotions are detected varies by emotion type. For instance, preschoolers detect happiness more quickly than anger, fear, and sadness (Boyatzis, Chazan, & Ting, 1993). Children’s speed in identifying negative emotions improves with age (Feldman & Tyler, 2006).

Compared to research on encoding and decoding of facial expressions, there have been relatively few studies which have examined the development of children’s use of gestures in recent years. A study by Michael and Willis (1968; as cited in Wood, 1976) demonstrated the

ability of children between the ages of four and seven to transmit and interpret 12 commonly used gestures among this group (i.e., “Go away,” “Come here,” “Yes,” “No,” “Be quiet,” “How many?” “How big?” “Shape, such as round or square,” “I don’t know,” “Goodbye,” “Hi,” and “Raised hand for attention”). Children interviewed in the study were asked to produce these gestures, as well as interpret these same gestures as presented by the interviewer (e.g., “If you had to be quiet and you were over there [pointing away] and you wanted me to come to you, what would you do?”). Results indicated that children with one year of school (about six years of age) were better at transmitting and interpreting gestures compared to preschool children. Second, males were more accurate than girls in interpreting gestures. In addition, accuracy of transmitting and interpreting gestures varied by social class. Specifically, children from middle-class backgrounds were more accurate than children from lower-class families. However, the researchers expressed caution in interpreting the results to indicate differences among children from middle-class and lower-class backgrounds. This expressed caution was due to the fact that the chosen gestures for the study were derived from typical gestures of children from middle-class, rather than lower-class families. In addition, a bias may have existed in that the informants who interpreted participants’ gestures were from middle-class backgrounds as well. However, overall, the results from this study indicate sex differences between boys and girls in their interpretation of gestures. In addition, the ability to transmit and interpret gestures among children appears to improve with age.

Children’s use of paralinguistic to infer emotion has also been examined. At about nine months of age, infants start to show evidence of sensitivity to the main paralinguistic features in the vocal channel of nonverbal communication (Friend, 2000). When lexical content of a verbal message (e.g. “Don’t touch that”) interfere with paralinguistic (e.g., an approving voice), younger

children (about age four) tend to pay attention more to the lexical components. However, at about age seven, children pay attention more to the role of paralanguage in conflicting messages. Between the ages of four to ten, children's ability to interpret affect through paralanguage becomes increasingly accurate. However, this developing ability is a slow and steady process (Wood, 1976). Compared to other forms of nonverbal communication, young children's ability to interpret emotion messages heard through the vocal channel is far more difficult than a message transmitted verbally or bodily.

It is important for children to enhance their knowledge of display rules, mixed emotions, and nonverbal communication strategies. According to McDowell and Parke (2000), developing one's knowledge of display rules is an important social skill. For example, a child who is able to control their level of excitement or sense of pride in response to an accomplishment in front of a competitor may receive more acceptance from their peers. It is similarly important for a child to develop an adequate understanding of mixed emotions. According to Steele and his colleagues (1999), children's ability to "understand mixed emotions facilitates the satisfactory resolution of social and emotional challenges in daily life" (p. 162). Finally, mastery of nonverbal communication is also vital. According to Feldman, Philoppot, and Custrini (1991), the success of social interactions depend to a large degree on an individual's nonverbal communication ability. As a result, deficiencies in nonverbal communication can lead to poor social interactions. The next section will examine the relation of individual differences in emotion understanding to psychosocial adjustment.

Emotion Understanding and Psychosocial Adjustment. Children's level of emotion understanding has been examined in relation to outcome variables, such as psychosocial adjustment and social competence. Aspects of emotion understanding that have been assessed

include the labelling of emotional expressions (e.g., Schultz, Izard, Ackerman, & Youngstrom, 2001), identifying situations that elicit emotions (e.g., Denham, McKinley, Couchoud, & Holt, 1990), understanding of display rules that govern the expression of emotion (e.g., Garner, 1996), and understanding complex or mixed emotions (e.g., Denham et al., 2002). Researchers who assess emotion understanding tend to examine one or more of these components simultaneously within a study.

Children's level of emotion understanding has been related to ratings of likeability by their peers or social status, and social competence (Denham et al., 1990; McDowell & Parke, 2000; Miller et al., 2005). In addition, there are also important links between emotion understanding and peer relations. Cassidy, Parke, Butkovsky, and Braungart (1992) explored emotion understanding, emotional expressiveness, and peer relations among children from low-income families longitudinally from kindergarten to grade-one. Children's understanding of basic emotions (happiness, sadness, anger, and fear) was assessed through an interview. Results indicated that children's understanding of emotions predicted their peer relations. Overall, children with better knowledge of emotions tended to be accepted more by their peers and had more positive relationships (Cassidy et al., 1992).

Prosocial behaviour has also been studied in relation to emotion understanding in research. Garner (1996) studied the following affective skills among grade-three-to-four children, who come from low-income backgrounds: emotional role taking, affective/moral attributions, and display rule knowledge. Emotional role taking refers to the ability to identify feelings in self and others. Affective or moral attributions denote the understanding that one's behaviour may influence the feelings of others. These three affective skills were assessed through children's reasoning to vignette presentations. Results indicated that children's

prosocial behaviour could be predicted by their level of emotional role taking and knowledge of emotion display rules.

Researchers have also assessed children's level of emotion understanding in relation to social, emotional, and behavioural adjustment. For instance, in a study by Denham and her colleagues (2002), emotion understanding was studied longitudinally in relation to behaviour problems (e.g., aggression and anger) among children aged three to four until the ages of five to six. Emotion understanding was first assessed through a puppet task that required the identification of basic emotions (happy, sad, angry, and afraid), and at later points through vignettes examining mixed emotion and display rule knowledge. In addition, children's levels of anger and aggression were measured through teacher report and naturalistic observation. Results indicated that children's initial level of emotion understanding (age three to four) predicted their levels of anger and aggression (at age three to four and five to six), particularly for boys. Similar results have been demonstrated in previous research, indicating that children who exhibit behaviour problems (e.g., aggression) also show difficulties with their understanding of emotions (Bohnert, Crnic, & Lim, 2002; Cook, Greenberg, & Kusche, 1994; Hughes, Dunn, & White, 1998).

Deficits in emotion understanding have also been found to predict symptoms of internalizing disorders. One study (Fine, Izard, Mostow, Trentacosta, & Ackerman, 2003) examined emotion understanding (emotion expression labelling and emotion situation knowledge), expressive vocabulary, caregiver-reported per capita income, and psychosocial adjustment (externalizing and internalizing problems) longitudinally among children from economically disadvantaged families aged seven to eleven. According to Fine and her colleagues (2003), emotion expression labelling referred to the ability "to associate words and

verbal meaning to expressive cues of emotion” (p. 332), and emotion situation knowledge referred to “the ability to infer emotions of others through situational cues” (p. 332). Emotion expression labelling and emotion situation knowledge were measured by tasks which required children to label pictures of facial expressions and to label the emotion of a protagonist in various vignettes, respectively. Children’s psychosocial adjustment was rated by teachers when the children were seven years of age and children provided a self-report measure of psychosocial adjustment at age eleven. In line with the researchers’ predictions, higher levels of emotion understanding at age seven predicted self-reported internalizing behaviours at age eleven, after controlling for caregiver-reported per capita income, expressive vocabulary, and teacher reported psychosocial adjustment. The researchers explained this result by the fact that continued difficulties with emotion understanding may lead to poor outcomes in social situations, where repeated unsuccessful interactions may lead to social isolation and internalizing difficulties, such as anxiety, loneliness, and feelings of guilt, shame, sadness, and fear. These outcomes may further perpetuate the problematic social interactions with others.

A study on psychosocial adjustment and emotion understanding in children from economically disadvantaged families (Schultz et al., 2001) examined emotion understanding, attentional control, behavioural control, and verbal ability in relation to social problems and withdrawal among first-grade children. In this study, behavioural control referred to a child’s activity level (e.g., not fidgeting and ability to sit still), ability to adapt to change (e.g., not repeating behaviour that has been previously punished), and persistence level (e.g., the ability to persevere when faced with a difficult task). Attentional control referred to a child’s ability to focus and sustain his or her attention. Emotion understanding was assessed through the labelling of pictures of emotional expressions as well as through a task requiring children to label the

emotions of a protagonist within different stories. Verbal ability was measured by a test which required participants to identify a target word among one of four drawings. Findings indicated that children's level of emotion understanding predicted teacher-rated measures of their social problems and social withdrawal, after attentional control, behavioural control, and verbal ability were controlled for.

Similar results were found by Izard and his colleagues (2001), who assessed emotion understanding, social behaviour, academic competence, verbal ability, and temperament among preschool children from low-income families at the ages of five and nine. The researchers examined the emotion understanding through an emotion labelling and emotion recognition task where participants were required to identify facial expressions of nine basic emotions (i.e., interest, joy, surprise, sadness, anger, disgust, contempt, shame, and fear) in photographs and produce labels for the nine basic emotions. Social behaviour was assessed through a teacher-reported social skills rating measure. Temperament was measured through a questionnaire which assessed inattention, with higher scores indicating temperament related problems. Results demonstrated that both verbal ability and temperament (at age five) contributed to the prediction of social behaviour (at age nine), with lower temperament-related difficulties and higher verbal ability predicting more prosocial behaviour. However, emotion understanding remained a significant predictor of later social behaviour, after the variance explained by temperament and verbal ability was removed. Therefore, children's level of emotion understanding when they are young has important implications for their later social behaviour.

A specific aspect of emotion understanding, the receiving (decoding) of nonverbal cues of emotion, has been examined in relation to social competence or popularity. Research has demonstrated relations between facial decoding and popularity or social competence (e.g.,

Custrini & Feldman, 1989; Denham et al., 1990) using normative samples of children. The relation between nonverbal decoding skills and social competence has also been examined in clinical samples. For instance, Cooley and Triemer (2002) explored nonverbal decoding abilities in the domains of paralanguage (i.e., tone of voice) and facial expressions in relation to classroom behaviours using a sample of primarily African American boys (mean age of about 10) with severe emotional disturbance and a comparison group. A brief questionnaire was administered in order to examine teachers' perceptions of participants' classroom behaviours, such as popularity and frequency of aggressive behaviours. Results showed no significant differences between the participants with severe emotional disturbance and the comparison group on a measure assessing nonverbal decoding abilities. Differences were found between the two groups, however, when the relationships between nonverbal decoding skills and aggressive classroom behaviours were examined. Better nonverbal decoding skills predicted fewer aggressive behaviours for children who were emotionally disturbed, but not for the control group. These findings highlight the large impact that nonverbal decoding skills may have on the social behaviour of boys who are emotionally disturbed. Cooley and Triemer stated that nonverbal decoding may play a more important role in predicting the social behaviour of boys who are emotionally disturbed since they have limited verbal social skills.

In sum, research suggests that a higher level of emotion understanding is associated with better psychosocial adjustment whereas a lower level predicts a wide range of psychosocial difficulties in children.

Development of Emotion Regulation. Among researchers, little consensus has been reached regarding the definition and conceptualization of emotion regulation (Eisenberg & Fabes, 2006). According to Denham (1998), this challenge can be explained by the fact that this

component is hard to separate from the experience and expression of emotion, and also, to a certain degree, the understanding of emotion. In addition, the multifaceted nature of emotion regulation and how it is manifested at different ages of development also contribute to the challenge in defining it (Eisenberg, Spinrad, & Smith, 2004).

According to Kopp and Neufeld (2003), definitions of emotion regulation among researchers have emphasized one of the three following areas: (1) content (i.e., the components of emotion regulation), (2) function (e.g., activities involved in emotion regulation), and (3) processes (e.g., how emotion regulation occurs). For instance, Thompson (1994) defined emotion regulation in terms of its processes and referred to it as “the extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions, especially their intensive and temporal features, to accomplish one’s goals” (pp. 27 – 28). Alternatively, an example of a content-oriented view on emotion regulation is given by Denham (1998). Denham argued that this process involved the three following components: emotional arousal, cognitive construal, and behavioural action. Finally, a functional approach to emotion regulation is exemplified by Kopp (1989), who viewed emotion regulation as involving the proper adjustment of one’s emotional arousal to fit demands presented by the situation at hand. Although these different definitions of emotion exist, most definitions either explicitly or implicitly acknowledge that emotion regulation must be adaptive (Kopp & Neufeld, 2003). For instance, function-oriented definitions view emotion regulation as a means of adapting one’s behaviour to meet situational demands and process-oriented definitions paint this ability as one’s adaptation to the presenting environment. This study will present a process-oriented view of emotion regulation as proposed by Shields and Cicchetti (1997). Based on previous definitions (i.e., Cicchetti, Ganiban, & Barrett, 1991; Thompson, 1994), Shields and Cicchetti stated that emotion regulation

can be “defined in terms of lability, flexibility, and situational responsivity and conceptualized as the capacity to modulate one’s emotional arousal such that an optimal level of engagement with one’s environment is fostered” (p. 907). This definition emphasizes the flexible nature of emotion regulation.

During the first two years of life, emotion regulation primarily serves to control infants’ level of physiological arousal (Kopp & Neufeld, 2003). From birth, caregivers play an important role in this intervention, and relieve infant’s distress resulting from a variety of sources, such as hunger, fatigue, and discomfort (Thompson & Meyer, 2007). In order for appropriate intervention to take place, infants must be accurate in the analyzing their physiological states which may result in distress, and be able to effectively communicate these states to their caregivers (Cicchetti et al., 1991). The effectiveness of this communication depends on the accuracy of the caregiver in interpreting the message as well as the infant’s ability to transmit understandable cues regarding their internal states. Over time, the continued use of adult intervention to soothe an infant’s discomfort contributes to the infant’s basic behavioural expectations that adult intervention will reduce distress (Thompson & Meyer, 2007). As a result, the learned associations between the infant’s distress, caregiver’s approach behaviour, and the infant’s return to emotional equilibrium, has important implications since the infant learns to engage in anticipatory soothing before the caregiver’s arrival. In addition, this notion suggests that variations in caregiver responsiveness to infant distress impact how easily infants soothe to caregiver intervention or their expectations regarding the approach behaviour of their caregivers.

Caregivers and other adults continue to play an important role in regulating the emotion in the toddler and preschool years (Denham, 1998). During this time, caregivers assist their children in using specific emotion regulation strategies. Caregivers’ strategies to manage their

child's emotions include structuring the environment in order to match the child's emotion regulation abilities (e.g., the avoidance of arranging a play date with a particular child who routinely aggravates their son or daughter), distracting their child in order to take attention away from a frightening or upsetting situation, helping their children solve frustrating problems, altering their child's perception of a situations that arouse negative emotions (e.g., "It's just a game"), suggesting appropriate alternatives of responding emotionally, and encouraging the use of verbal messages to express feelings (Denham, 1998; Thompson & Meyer, 2007). Although caregivers aid their children in the process of emotion regulation, the child is not a passive recipient. Rather, according to Denham, "as the preschool period progresses, adult support is still important, but emotion regulation is more and more a partnership as children become simultaneously more autonomous and more capable of cooperation" (p. 158).

During the preschool years, young children begin to see connections between their use of emotion regulation strategies and its resulting effect on their emotional states (Denham, 1998). As a result, young children begin to see the application value of using such strategies to regulate emotions. These children become more flexible in their use of emotion regulation strategies, and appreciate their attempts at emotion regulation which result in positive or negative consequences. Examples of emotion regulation strategies that young children use include focusing on nondistressing elements instead of distressing components of the environment and finding a new motive or modifying the thought causes of one's emotion. Emotion regulation strategies tend focus on more cognitive aspects rather than behavioural components after the preschool period.

Regardless of which emotion regulation strategies are employed by children, it is necessary that they feel that they have control over these strategies (Denham, 1998). According to Denham (1998), a lack of control over emotion regulation strategies can result in less desirable

outcomes such as venting behaviours and sublimation of emotional discomfort through illness, compensatory activities, or dissociation.

Emotion Regulation and Psychosocial Adjustment. Children's emotion regulation has been examined in relation to their level of psychosocial adjustment in research. Other emotion-related aspects have also been assessed alongside emotion regulation. These aspects have included personality factors (e.g., Spinrad et al., 2006), emotional expressiveness, and emotionality (e.g., Eisenberg, Fabes, Guthrie, & Reiser, 2000; Eisenberg et al., 2001; Rydell, Berlin, & Bohlin, 2003), defined as the one's level of reactivity to emotion. Emotion regulation has also been explored in conjunction with emotion understanding in this type of research (e.g., Denham et al., 2003; Miller, Fine, Gouley, Seifer, Dickstein, & Shields, 2006). Aspects of emotion regulation that have been assessed in relation to psychosocial adjustment include effortful control and impulsivity (e.g., Spinrad et al., 2006); and attentional and behavioural regulation (e.g., Eisenberg et al., 2001).

Research has examined the relation between aspects of negative dispositional emotionality and emotion regulation with psychosocial adjustment. A study by Eisenberg and her colleagues (2001), examined negative dispositional emotionality (i.e., anger/frustration, sadness, and fear), and emotion regulation and control in relation to externalizing and internalizing problems among children about age four to eight. Emotion regulation was assessed through adult-report and observational measures that looked at effortful behavioural regulation, such the ability to sit still, and attentional regulation, such as the ability to concentrate when working on a project. Results indicated that externalizing and internalizing problems were characterized by specific aspects of emotionality, and emotion regulation and control. In general, compared to children with internalizing problems and a comparison group, children with

externalizing problems were prone to anger, impulsivity, and were lower on measures of regulation. In addition, children with internalizing problems were susceptible to sadness, low attentional regulation, and low impulsivity. These findings compliment previous research which has found that impulsivity and low behavioural control are predictive of externalizing problems, and that behavioural inhibition (e.g., the display of inflexibility in behaviour and inhibition in response to novel situations) is predictive of internalizing problems (Eisenberg et al., 2000). Overall, emotionality and emotion regulation are connected with particular aspects of psychosocial adjustment in distinct ways.

Emotion regulation has been found to be predictive of social competence, both contemporaneously and longitudinally (Eisenberg et al., 1997). There is also evidence that resiliency may be a mediator between emotion regulation and social competence. Spinrad and her colleagues (2006) assessed emotion regulation in relation to resiliency, adult-rated popularity, and social competence longitudinally among children aged four to eight after a two year period. Emotion regulation was measured through participants' level of impulsivity, a reactive mode of regulation, and effortful control, a more voluntary component of regulation. Effortful control encompassed abilities such as regulating one's behaviour, shifting attention when needed, and focusing on a present task. Resiliency, defined as the ability to adapt flexibly to the demands of one's environment, was rated through a personality questionnaire completed by parents. Finally, children's level of social competence and popularity were both rated by teachers and parents. Findings indicated that resiliency (at age four to eight) predicted effortful control (at age six to ten), and that popularity (at age four to eight) predicted resiliency (at age six to ten). This study demonstrates the possible role of personality variables, such as resiliency, in mediating the relationship between effortful control and popularity over time.

Emotion regulation and emotion understanding are related in important ways. Emotion regulation has been found to predict young children's emotion understanding after a two year period (Schultz et al., 2001). In addition, emotion understanding and emotion regulation both give important contributions to social competence. For instance, a study by Denham and her colleagues (2003) assessed patterns of emotional expressiveness, emotion regulation, and emotion understanding in relation to social competence longitudinally among three- and four-year old children (preschool) until the ages of five and six (kindergarten). Measures of emotion regulation were obtained through a classroom observation and maternal report. Emotion understanding was assessed through an emotion situation identification task where participants watched an emotion-eliciting situation enacted by puppets and then were required to identify the emotion of the puppet. Social competence was rated by both peers and teachers of the participants. Results showed that that emotional expressiveness, emotion regulation, and emotion understanding made contributions to social competence when assessed at both ages three to four and ages five to six. Overall, these findings highlight the importance of emotion regulation, emotion understanding, and other aspects of emotion competence in influencing children's social functioning and degree to which they are accepted by their peers.

Emotion regulation and emotion understanding have also been jointly explored in relation to classroom adjustment. A recent study (Miller et al., 2006) explored the following factors in relation to classroom adjustment among preschoolers (aged three to five) from low-income families: emotion understanding, expressed emotions, and emotion regulation. Expressed emotions were judged through classroom observation where observers made note of a variety of emotion states expressed by participants. Emotion understanding was explored through an emotion recognition, emotion situation knowledge, and expressive behaviour knowledge task. In

the emotion recognition task, participants were first required to produce a label for an emotion depicted in four drawn faces of emotion (happy, sad, angry, and sad) and then were given an emotion label and asked to identify the target emotion among the drawn faces of emotion. Emotion situation knowledge was assessed through a task which necessitated participants to identify an emotion (using the drawn emotion faces from the emotion recognition task) from a vignette they were presented with. Finally, expressive behaviour knowledge was measured through a task which had participants identify the emotion of a protagonist in a vignette acted out by puppets. Emotion regulation (positive emotion regulation and negative dysregulation) and classroom adjustment (i.e., participants' social skills, and levels of anxiety and aggression) were both rated through a teacher questionnaire. Examples of positive emotion regulation and negative dysregulation included showing empathy towards others and being prone to angry outbursts, respectively. Results yielded important relationships between the examined variables and with the variables in relation to classroom adjustment. First, higher emotion understanding was related to positive emotion regulation, but not to negative dysregulation or poor emotion regulation. Negative emotion expression was associated with poorer social skills and higher levels of aggression, but not when emotion regulation was accounted for. In addition, both positive and negative emotion regulation were found to predict social skills, aggression, and anxiety, with all other variables entered as covariates. In sum, this study highlights the importance of emotion regulation in influencing the social functioning of children.

Overall, research suggests associations between more effective emotion regulation and better psychosocial adjustment.

Objectives and Hypotheses

This study has the following three main objectives.

1) The first objective is to examine affective, anxiety, attention/deficit hyperactivity, and oppositional defiant problems (i.e., psychosocial adjustment) among young children with NLD compared to a typically achieving control group. Research has demonstrated that children with NLD suggested poorer behavioural, social, and emotional functioning compared to children with other learning disabilities (e.g., Petti et al., 2003; Fuerst, Rourke, & Fisk, 1990). However, little research has examined the social, emotional, and behavioural functioning of children with NLD compared to children without NLD. In addition, very little research has specifically examined young children with NLD. Therefore, the first objective of this study is to examine psychosocial adjustment among young children with and without NLD. It is expected that young children with NLD will experience greater social, emotional, and behavioural difficulties compared to other children their age. This prediction is based on clinical reports indicating that children with NLD are at risk for developing a wide range of social, emotional, and behavioural difficulties (e.g., Palombo, 1996), and research which suggests that older children with NLD experience psychosocial adjustment difficulties (e.g., Galway & Metsala, in press; Petti et al., 2003; Fuerst, Rourke, & Fisk, 1990).

2) The second objective is to identify potential differences in understanding of emotions through vignettes read to children (i.e., display rule knowledge, mixed emotion knowledge), and through pictures of faces and gestures, and by listening to tone of voice (i.e., paralanguage or nonverbal emotion decoding) among young children with and without NLD. These areas of emotion understanding were examined because they have been shown to be important contributors to childhood adjustment and social competence (e.g., Fine et al., 2003; Schultz et al., 2001). It was therefore expected that these areas would be impaired or problematic in young children with NLD. .

3) The third objective is to investigate differences in emotion regulation as measured by parent reports among young children with and without NLD. It is expected that children with NLD will be reported to experience more difficulties with emotion regulation compared to children without NLD. Since research has linked poorer psychosocial adjustment with difficulties in emotion regulation (e.g., Eisenberg et al., 2001; Rydell, Berlin, & Bohlin, 2003), the anticipated social, emotional, and behavioural difficulties experienced by children with NLD are expected to occur alongside related difficulties in emotion regulation.

Method

Participants

A total of 20 participants (10 with NLD and 10 Normally Achieving (NA) children) between the ages of six and nine participated in this study. Participants with NLD met the following criteria: (1) Verbal IQ (VIQ) at least 85 or higher and at least a ten-point discrepancy with higher VIQ than Performance IQ (PIQ), (2) at least one standard deviation below the mean on one or more subtests that measure participants' visual-spatial reasoning (i.e., Block Design and Object Assembly subtest on the WISC-III or the Matrix Reasoning subtest from the WISC-IV), (3) at least one standard deviation below the mean on the Grooved Pegboard Task and/or Target Test, (4) a score within the average range (i.e., above the 30th percentile) on the WRAT-3. The study did not include arithmetic criteria to classify participants with NLD. Although children with NLD tend to demonstrate difficulties in mathematics compared to a higher performance in single-word reading and spelling (Rourke, 1987), some young children with NLD do not demonstrate this difference in performance (Drummond, Ahmad, & Rourke, 2005), or may only display this discrepancy until they reach grades two to four (Rourke, 1995). As a

result, arithmetic criteria were removed in order to collect a more representative sample of young children with NLD.

Participants in the NA group were matched with participants who have NLD, as closely as possible, on the basis of VIQ. In addition, participants in the NA group met the following criteria: (1) VIQ of at least 85 or above, (2) at or above 90 on the Grooved Pegboard Task and/or the Target Test, and (3) a score within the average range (i.e., above the 30th percentile) on the Word Reading subtest of the WRAT-3.

Procedure

Data for the present study was previously collected under the direction of Dr. Jamie Metsala for the purposes outlined in this study and has not been previously reported. Participants with NLD were recruited using two methods. First, parents of clients at an accredited mental health centre for children with learning disabilities in a large metropolitan area, six to nine years of age, diagnosed with NLD or suspected of having NLD, were asked to participate. Potential participants were informed that their participation was voluntary and would not impact the services they received through the clinic. As an added benefit, participants who decided to take part in the study were given a brief psycho-educational report and the opportunity to discuss this report with an assessor after the study was completed. Second, in order to increase the amount of participants with NLD within the ages of six to eight, a notice was sent out to individuals who frequently referred to the clinic and professionals in the community who commonly work with children who have NLD. This letter outlined the study and requested referrals for participants. Potential participants were screened in order to determine study eligibility. Upon study completion, participants were given a time-limited clinical intervention. In addition, participants

suspected of meeting NLD criteria, but did not have a psycho-educational assessment, were given a number of eligibility criteria measures that are described later in this section.

Participants in the Normally Achieving (NA) comparison group were recruited through advertisements which briefly outlined the study. Participants who took part in the study were given a small remuneration of \$20.00 upon study completion, which acted as a small incentive and reward for their time and effort. Participants from the NA group did not receive services from the clinic or a psycho-educational assessment report.

Parents who agreed to take part in the study were contacted by a psychologist to book an appointment. During this time, the assessment process was explained and any concerns about the child to be addressed during the assessment were gathered. In addition, any questions that parents may have had about the study were answered. The study took place over the span of one month in three to four sessions. With the exception of the WISC-III, all tasks took about ten minutes to complete. The length of each session depended on the child's ability to attend to the tasks. If the child experienced fatigue, the session ended, even if all of the required tasks were not completed. Parents were required to complete two standardized questionnaires regarding their child's social, emotional, and behavioural adjustment (i.e., CBCL/6 – 18), and their child's ability to regulate his or her emotions (i.e., ERC).

At the end of the study, parents were given a brief report which contained information on the results of standardized cognitive, academic, and socio-emotional tests. In addition, a follow-up appointment was scheduled to give parents the chance to review the results of this assessment and to answer any questions or concerns.

Selection Criteria Measures

A number of participant selection criteria measures were administered to participants in order to determine their eligibility in the NLD or NA group.

Wechsler Intelligence Scale for Children – Third Edition (WISC-III; Wechsler, 1991). The WISC-III was given to participants with NLD or to those who were suspected to have NLD but did not have a previous psychoeducational assessment. The WISC-III provided an index of children's verbal reasoning skills, nonverbal reasoning skills, processing speed, and their ability to focus without distraction (Wechsler, 1991).

Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999). Children in the Normally Achieving (NA) group completed the WASI. The WASI, a brief, reliable, and valid measure of intelligence, can be administered to individuals ranging from age 6 to 89 (Saklofske, Caravan, & Schwartz, 2000). The WASI is structured in a shorter format compared to the WISC-III. Specifically, the WASI includes four subsets of the WISC-III (i.e., Vocabulary, Similarities, Block Design, and Matrix Reasoning) which yield a Verbal Intelligence Quotient (VIQ), Performance Intelligence Quotient (PIQ), and a Full Scale Intelligence Quotient (FSIQ).

Wide Range Achievement Test – Third Edition (WRAT – 3; Wilkinson, 1993). Reading and math subtests of the WRAT-3 were administered to all participants. These two subtests provided a measure of children's word reading and mathematical calculation skills, respectively.

The Target Test (Reitan, 1966). Participants with NLD completed the Target Test, which provided an index of their visual-motor coordination. The Target Test consists of a board containing 25 holes of differing shapes. A child who completed this test was required to position pegs correctly in the first 10 holes of the board. The time a child took to complete this task acted as a measure of his or her performance, with faster times being superior to slower times.

The Grooved Pegboard task (Klove, 1963). Participants with NLD completed the Grooved Pegboard Test, which provided an index of their ability to process visual-spatial relationships. It consisted of an 18” by 18” target board with three rows of three dots. The administrator “tapped out” a design using a pointer and, after a three second delay, the child was required to reproduce this design on an answer sheet.

Dependent Measures

Measure of Psychosocial Adjustment: The Child Behavior Checklist (CBCL; Achenbach, 2001). The CBCL for ages six to eighteen form was completed by the parents of participants for the study. The CBCL is questionnaire with 118 items assessing potential social, emotional, and behavioural difficulties experienced by children. Parents were required to use a three-point rating scale to indicate whether each item was *not true/as far as you know* (0), *somewhat or sometimes true* (1), or *very true or often true* (2) of their child. Items combined to provide Syndrome Scales for anxious/depressed behaviours, withdrawn/depressed behaviours, somatic complaints, social problems, thought problems, attention problems, rule-breaking behaviours, and aggressive behaviours. Furthermore, items could also be combined to form DSM-Oriented Scales for affective problems, anxiety problems, somatic problems, attention deficit/hyperactivity problems, oppositional defiant problems, and conduct problems.

Measures of Emotion Understanding. The following measures of emotion understanding were administered to all participants.

Mixed emotions task. A task developed by Gordis, Rosen, and Grand (1989) was used to assess participants’ understanding of situations that resulted in simultaneous emotions of conflicting valence (i.e., mixed emotions). In this task, participants were presented with eight stories depicting situations where a protagonist could experience two emotions (e.g., “Today is

Kenny's birthday, and he is having a birthday party with a birthday cake and lots of friends. But, his best friend gets sick and can't come to the party"). The sex of the protagonist in each story was matched to the sex of each participant. First, the examiner asked participants to indicate one way the protagonist might feel in the story (e.g., "How does Kenny feel?"). If only one emotion was mentioned, the examiner then prompted the participant to produce an additional answer (e.g., "How else does Kenny feel?"). Finally, the examiner asked participants to indicate why the protagonist might feel two emotions simultaneously (e.g., "Can you tell me why he feels both _____ and _____ at the same time?"). Each story was scored with the following criteria: two points for naming two emotions, one point for identifying one, and zero points for producing neither.

Knowledge of display rules task. An additional task developed by McDowell and Parke (2000) was used to assess participants' knowledge of display rules. Here, participants were presented with four vignettes where the use of display rules by a protagonist was appropriate (e.g., "Danielle has a stomach ache, but wants to go outside and play with her friends. She knows that her mother will not let her go outside if she is feeling sick"). The sex of the protagonist was matched to the sex of the participant. First, participants were asked by the examiner to indicate how the protagonist felt in the particular situation (e.g., "How do you think Danielle feels about having a stomach ache?"). Next, participants were required to state how the protagonist's face would look (e.g., "How do you think Danielle's face would look?"), and why this was the case (e.g., "Why do you think her face looked that way?"). Participants were given points for each story based on the following scoring system: two points for using a correct display rule, one point for using a display rule but was not of a socially appropriate nature, and zero points for no mention of a display rule. Points collected from each story combined to form

a “Display Rule” score. McDowell and Parke reported adequate inter-rater reliability for the scoring of the vignettes, with a correlation of .84.

Emotion decoding tasks. Participants’ emotion decoding ability was assessed with three subtests of the revised Diagnostic Analysis of Nonverbal Accuracy (DANVA-2; Baum & Nowicki, 1998; Nowicki & Duke, 1994). The DANVA provided a measure of the child’s ability to interpret nonverbal cues within four basic emotions: happiness, sadness, anger and fearfulness. Each participant was provided with a sheet of paper which denoted these four basic emotions in order to help them with each subtest. The Postures subtest consisted of 12 slides showing the portrayal of the basic emotions by an adult female. The Facial Expressions subtest consisted of 48 slides (12 with a female child, 12 with a female adult, 12 with a male child, and 12 with a male adult) portraying basic emotions as well as neutral emotions. Finally, the Paralanguage subtest consisted of 24 audio recordings of one sentence (“I am going out of the room and I will be back later”) varying in tonal qualities to reflect basic emotions. For the Postures, Facial Expressions, and Paralanguage subtests, Nowicki and Duke (1994) reported adequate internal consistency and test-retest reliabilities with correlations ranging from .77 to .88 and .74 to .84, respectively. Performance on the DANVA has also been related with generalized feelings of personal incompetence (Nowicki & Carton, 1997), and an external locus of self-control, reduced popularity, and lowered academic competence (Nowicki & Duke, 1992). In addition, in a study by Hallin (1991; as cited in Nowicki & Duke, 1994), children and adolescents who were emotionally disturbed were found to score significantly lower on the facial expressions and paralanguage subtest of the DANVA compared to same-age controls. Performance on the DANVA has not been found to be related to intelligence or cognitive ability. The most recent version of the DANVA (i.e., DANVA-2) has demonstrated adequate internal consistency, with a

Cronbach alpha coefficient of 0.71 and 0.70 among 4-year-old children and second- to sixth-grade children, respectively (Baum & Nowicki, 1998).

Emotion Regulation Checklist (ERC; Shields & Cicchetti, 1997). Participants' ability to regulate their emotions, as reported by their parents, was assessed by the Emotion Regulation Checklist (ERC). The ERC is a 24-item questionnaire which measures various aspects of emotion regulation, such as the lability, flexibility, intensity, valence, and situational appropriateness of emotion. The scale included positively and negatively weighted items which were rated by parents on a four-point Likert scale, ranging from 1 (*Rarely/Never*) to 4 (*Almost always*). Examples of items included "Responds positively to neutral or friendly overtures by peers" and "Is whiny or clingy with adults." Items could be grouped into the following two subscales: the Lability/Negative scale (15 items) and Emotion Regulation scale (8 items). The Lability/Negative scale is comprised of items reflecting inflexible, labile, and uncontrolled negative emotion. The Emotion Regulation scale included items which described situationally appropriate display, empathy, and emotional self-awareness. The Lability/Negative scale and Emotion Regulation scale are highly correlated. As a result, these two scales were combined into a composite score.

Shields and Cicchetti (1997) established convergent validity between the ERC and other well-established measures of emotion regulation, such as the California Q-Set and the Minnesota Behavior Ratings. In addition, the ERC was able to differentiate among various groups of children, such as children who are well-regulated and dysregulated, and children who are maltreated and nonmaltreated. In terms of reliability, the Lability/Negative scale and the Emotion Regulation scale were found to have alpha coefficients of .96 and .83, respectively. The alpha coefficient for the composite score was .89.

Results

Selection Criteria Results

Table 1 displays descriptive analyses (the means and standard deviations) for children with NLD and NA children on age and selection criteria measures. An independent samples t-test analysis showed that children with NLD ($M = 99$ months, $SD = 9.82$) were significantly older than NA ($M = 87.90$ months, $SD = 10.81$) children, $t(20)=2.40$, $p<.05$. Because the dependent variables, such as emotion understanding, are developmentally sensitive, subsequent analyses conducted on nonstandardized tasks (i.e., tasks of emotion understanding and emotion regulation) were done by using age as a covariate in tests of univariate analyses of covariance (ANCOVA). Since children with NLD were expected to perform more poorly than NA children on all of the selection criteria measures and dependent variables, one-tailed tests were utilized.

All of the selection criteria measures included 10 children with NLD and 10 NA children, with the exception of Block Design (10 children with NLD and 8 NA children) and Matrix Reasoning (9 children with NLD and 8 NA children). One-tailed univariate ANOVA tests indicated that children with NLD were significantly poorer than NA children on PIQ, Object Assembly, Matrix Reasoning, and the Grooved Pegboard Test (Nondominant Hand). No differences were seen between the two groups on VIQ, Block Design, WRAT 3 Reading, the Grooved Pegboard Test (Dominant Hand), and the Target Test. (Please see Table 1 for descriptive statistics and significance levels).

Psychosocial Adjustment

One-tailed, univariate ANOVA tests were conducted for each of the CBCL scales (i.e., Anxious/Depressed, Withdrawn/Depressed, Somatic Complaints, Social Problems, Thought Problems, Attention Problems, Rule Breaking Behaviour, and Aggressive Behaviour) and the

DSM scales in order to determine if significant differences emerged between children with NLD and NA children. It was expected that children with NLD would experience greater social, emotional, and behaviour difficulties as compared to same-age peers. As demonstrated in Table 2, a significant difference emerged between children with NLD and NA children on parent-reported measures of attention, anxiety, depression, bodily complaints, social difficulties, Aggressive, and Thought Problems in the expected direction on the CBCL scales, and on Affective Problems, Anxiety Problems, Attention/Hyperactivity Problems, and Oppositional Defiant Disorder Problems on the DSM scales; with the parents of children with NLD reporting more of these difficulties compared to the parents of NA children. Overall, compared to NA children, children with NLD were rated as displaying more symptoms of internalizing (i.e., Affective and Anxiety Problems) and externalizing (i.e., Attention/Hyperactivity and Oppositional Defiant Disorder Problems) disorders. The effect sizes for the significant differences between the two groups were weak to strong (0.19 – 0.65) (see Table 2). Mean scores for children in the NLD group in the clinically concerning or borderline ranges were observed on the Anxious/Depressed, Withdrawn/Depressed, Social Problems, Thought Problems, Attention Problems, and Aggressive Behaviour CBCL scales, and the Affective Problems and Anxiety on the DSM scales.

Emotion Understanding

In order to examine differences in emotion understanding among young children with and without NLD, one-tailed, univariate analyses of covariance comparing the performance of participants with and without NLD on the following measures were executed: DANVA-2 (i.e., a measure of nonverbal emotion decoding) that included facial expressions, tone of voice, and postures; display rule knowledge task developed by McDowell and Parke (2000); and mixed

emotion task developed by Gordis, Rosen, and Grand (1989). Participants' age was controlled for by including it as a covariate in the analyses.

Facial Expressions. On the DANVA, one-tailed, univariate analyses of covariance tests were conducted in order to determine if a difference in performance emerged between children with NLD and NA children on their recognition of four basic emotions (happiness, anger, fearfulness, and sadness) through facial expressions. It was expected that children with NLD would demonstrate poorer performance identifying basic emotions through facial expressions compared to NA children. The presentation of the four basic emotions varied through intensity (low or high) and model (adult or child). Although it would have been very helpful to determine if the performance of children with NLD and NA children varied by presentation intensity and model, the small sample size in this study did not allow for such an analysis. For this reason, the performance of children with NLD and NA children was examined for each of the basic emotions as a total score for recognition of both low and high intensity emotions through adult and child facial expressions combined. Table 3 displays the unadjusted means and standard deviations for each group. A significant difference, with NA children performing better than children with NLD, was found between the two groups on their accuracy scores for happiness. Overall, NA children showed better recognition of low and high levels of happiness, through pictures of adult and child facial expressions, compared to children with NLD.

Tone of Voice. On the DANVA, participants' recognition of basic emotions through tone of voice was also assessed with one-tailed, univariate ANCOVA tests, by controlling for age as a covariate. Participants with NLD were expected to demonstrate lesser accuracy identifying basic emotions through tone of voice compared to NA children. Similar to the presentation of basic emotions through facial expressions, the presentation of the four basic

emotions through tone of voice varied by intensity (low or high) and model (adult or child). Due to small sample size, only total score for each emotion was used in the analyses. No significant differences were noted between the two groups on their recognition of basic emotions through tone of voice

Postures. The final area of DANVA examined participants' identification of basic emotions through postures (pictures of different postures). The results of a one-tailed, univariate ANCOVA test examining differences in performance between children with NLD and NA children are displayed in Table 5. No significant differences were noted between the two groups in their accuracy in recognizing basic emotions through postures.

Mixed Emotions. A one-tailed, univariate ANCOVA test was conducted on the Mixed Emotion task to determine if differences in performance emerged between children with NLD and NA children. It was expected that children with NLD would have more difficulty indentifying and understanding mixed emotions compared to NA children. Results of the one-tailed, univariate ANCOVA indicated that children with NLD (unadjusted $M = 41.70$, $SD = 5.95$) performed significantly poorer than NA children (unadjusted $M = 42.22$, $SD = 5.31$), $F(1, 18) = 3.30$, $p < .05$, with an effect size (partial Eta squared) of .29. Overall, NA children demonstrated better identification and understanding of mixed emotions through vignettes compared to children with NLD.

Display Rules. A one-tailed, univariate ANCOVA test was conducted on the Display Rules task to determine if children with NLD and NA children differed in their performance. It was expected that children with NLD would have more difficulty identifying and understanding display rules compared to NA children. Results of the one-tailed, univariate ANCOVA demonstrated no significant differences between children with NLD (unadjusted $M = 5.90$, $SD =$

3.38), and without NLD (unadjusted $M = 5.22$, $SD = 2.54$) on their overall performance on the Display Rules task $F(1, 18) = .44$, $p = .33$, with an effect size (partial Eta squared) of .05.

Emotion Regulation

One-tailed, univariate analyses of covariance tests were conducted on the ERC to determine if differences emerged between children with NLD and NA on parent-reported measures of emotion regulation. The ERC was separately analyzed on the Lability/Negative scale (i.e., a measure of inflexible, labile, and uncontrolled negative emotion) and overall composite score (i.e., combination of the Lability/Negative scale and Emotion Regulation scale). It was expected that children with NLD would demonstrate higher ratings on the ERC, reflecting poorer emotion regulation, compared to NA children. The results of one-tailed, univariate analyses of covariance on this measure are presented in Table 6. In line with expectations, a significant difference emerged between the two groups on the Lability/Negative scale and composite score.

Discussion

The current study examined psychosocial adjustment among young children with and without NLD. Furthermore, this study compared these two groups in terms of their emotion understanding (nonverbal communication, and understanding of display rules and mixed emotions) and emotion regulation, as two components that have been linked to psychosocial adjustment in children, in the developmental literature (e.g., Eisenberg et al., 2001; Fine et al., 2003; Rydell, Berlin, & Bohlin, 2003; Schultz et al., 2001).

The first objective of this study was to examine behavioural, social, and emotional functioning among young children with and without NLD. In line with expectations, children with NLD were rated by their parents as experiencing significantly greater difficulties in areas of

attention, anxiety, depression, bodily complaints, social difficulties, aggressive behaviour, and thought problems. In addition, when differences between children with and without NLD on DSM-oriented scales were explored, it was found that children with NLD showed more symptoms of internalizing (i.e., Affective Problems and Anxiety Problems) and externalizing (i.e., Attention/Hyperactivity and Oppositional Defiant Disorder Problems) problems. These findings give unique contributions to the research literature in that they demonstrate that younger children with NLD experience a larger number of both internalizing and externalizing difficulties compared to same-age peers who do not have NLD. It is important to note that the mean ratings for quite a few subscales on the CBCL reached clinically significant (i.e., Withdrawn/Depressed and Attention Problems CBCL Scales), and borderline (i.e., Anxious Depressed and Thought Problems CBCL scales, and Affective and Anxiety DSM-oriented scales) levels. The remaining CBCL and DSM-oriented scales (i.e., Somatic Complaints, Rule Breaking Behaviours, and Aggressive Behaviour CBCL scales, and Somatic, Attention/Hyperactivity, Oppositional Defiant Disorder, and Conduct DSM-oriented scales) fell within the normal range, but they were higher than the ratings for the normally achieving children. The areas that were rated by the parents of children with NLD at or close to clinically significant levels were related to anxiety, depression, being withdrawn, thought problems, and attention difficulties. These results complement clinical reports about proneness of children with NLD to internalizing difficulties as well as attention and thought problems (e.g., Palombo, 1996).

The second objective of the study was to explore emotion understanding (nonverbal communication, and knowledge of display rules and mixed emotions) among young children with and without NLD. It was expected that children with NLD would demonstrate significantly poorer levels of performance on the emotion understanding tasks used in this study compared to

children without NLD. One aspect of nonverbal communication, the ability to identify (decode) basic emotions through facial expressions, postures, and tone of voice, was explored through the DANVA. Results of participants' performance on the DANVA yielded significant differences between children with and without NLD for their accuracy of only happiness, and not for the other 3 basic emotions (anger, fearfulness, and sadness), through facial expressions, presented by both adult and child models, in low- and high-intensity formats. Conversely, no significant differences were found between the two groups for recognition of emotions from postures and tone of voice. It is important to note that more detailed analyses suggested that children with NLD had more difficulty mostly for the subdued, or low-intensity expressions, rather than very obvious, or high-intensity expressions. Previous research has demonstrated that children with NLD were less adept at identifying more subdued facial expressions of emotions (Petti et al., 2003). The overall finding that children with NLD are less adept at identifying some subdued basic emotions through facial expressions has important implications. In particular, within normative developmental research, difficulties with identifying low intensity, rather than high intensity, basic emotions have been linked with social and emotional difficulties (Baum & Nowicki, 1993). As a result, this suggests that the psychosocial adjustment difficulties demonstrated by children with NLD are likely linked to their difficulties with identifying some low intensity formats of basic emotions.

It is still unclear in the current study as to why children with NLD, compared to children without NLD, demonstrated significantly poorer performance on only some, rather than all, basic emotions among the nonverbal areas and presentation models. With regards to the recognition of basic emotions through postures, it could be possible that the performances of the two groups of children did not significantly differ in this area because the basic emotions were only presented

in one fashion, and were not separated into low and high intensity formats. Consequently, significant findings may have been demonstrated if the postures subtest measured basic emotion recognition varying by level of intensity, as the significant finding in the previous nonverbal channel (i.e., facial expressions) was found when basic emotions were presented in a low intensity manner. The finding that children with NLD had more difficulty accurately recognizing happiness, presented by a child and adult model, through both low and high intensity formats, and not other emotions (that were all negative), suggests that children with NLD may be less likely to recognize when people around them show happiness, which may lead to a negative perception of the social environment. This notion is supported by previous research which has demonstrated that children with NLD tend to show a hostile attribution bias. For instance, Galway and Metsala (in press) demonstrated through the use of story vignettes that, compared to normally achieving children, children with NLD tended to perceive story characters as having a hostile intent. The difficulties that children with NLD have in recognizing happiness through facial expressions may contribute towards their demonstrated negative attribution bias. In order to investigate this, further research could be conducted to ascertain whether the misidentification of positive emotions through nonverbal channels contributes to the negative perception of others demonstrated by children with NLD.

With regards to the understanding of mixed emotions through vignettes, which involved language, rather than nonverbal channels, children with NLD demonstrated significantly poorer levels of understanding compared to children without NLD. This was in line with expectations. However, no significant differences between the two groups of children were found for their understanding of display rules (expressing emotions). When the mean performances of the two groups were examined on the display rules measure, children with NLD and without NLD

demonstrated poorer performance overall, obtaining accuracy scores of 49% and 44%, respectively. These were unadjusted scores. The accuracy scores using the adjusted means for children with and without NLD on the display rules task were 52% and 42%, respectively. In contrast, children with and without NLD demonstrated a high level of performance on the mixed emotions measure, with unadjusted scores of 87% and 88%, respectively. These accuracy scores were obtained by dividing the unadjusted mean accuracy score of both groups by the total possible score on the display rules and mixed emotions tasks. On the mixed emotions task, the accuracy scores using the adjusted means for children with and without NLD were 83% and 92%, respectively. The varying levels of performance and significance of these findings can be explained by examining research on the normative development of emotion understanding. With regards to mixed emotions, children develop the highest level of this type of emotion understanding at age eight (Wintre & Vallance, 1994). Alternatively, children develop the most complex understanding of display rules between the ages of six to ten (Josephs, 1994), developmentally at a later stage. It is possible that a significant difference between children with and without NLD, favouring children without NLD, was not demonstrated on the display rules measure because this type of emotion understanding had not yet been fully attained developmentally in these two groups of children. As such, differences in performance would have not been obtained due to both groups' poorer understanding of display rules overall.

The third objective of the study was to explore emotion regulation among young children with and without NLD. It was expected that children with NLD would be rated by their parents as having more difficulties regulating their emotions compared to children without NLD. In line with expectations, significant differences between children with and without NLD were obtained on the parent-rated measure of emotion regulation, with children with NLD rated as having more

difficulties with modulating and controlling their emotions. This finding adds unique contributions to literature by demonstrating that children with NLD demonstrate difficulties in their ability to regulate their emotions, a finding that has not yet been reported.

Limitations

There are a number of limitations of the current study that should be discussed. First, this study included a small sample size of children with and without NLD. The use of strict participant group criteria limited the amount of participants eligible for the study. As such, further research conducted with larger samples of children with and without NLD is still needed to confirm the present results. However, it should be mentioned that the use of homogenous groups of children with and without NLD in the current study has merit. Specifically, limited research exists which has examined the psychosocial adjustment profile of children with NLD using well-defined samples, particularly when samples involving younger children with NLD are utilized. Second, the measures incorporated in the study, with the exception of the CBCL, did not have normative data available as a basis of comparison. Consequently, it is difficult to ascertain how the overall performance of children with and without NLD on these measures compared to the general population of these groups. Future research would benefit from developing measures of emotion understanding and emotion regulation that provide normative information, for both typical and atypical populations of children. Third, due to the small sample size of children utilized in this study, regression analyses could not be conducted in order to determine the strength of relationship among emotion understanding, emotion regulation, and the social, emotional, and behavioural functioning of children with and without NLD. As a result, future research is required to provide further information within this area.

Implications for Practice and Future Research

The results of the current study may help provide direction for basic and intervention research with children with nonverbal learning disabilities, for both practice and future research. First, it is quite concerning that young children with NLD show clinically concerning levels of internalizing and externalizing difficulties, as rated by their parents. Consequently, practitioners should make sure that they comprehensively assess and evaluate social, emotional, and behavioural adjustment when working with young children with NLD. Second, the findings that children with NLD show difficulties on some aspects of emotion understanding and demonstrate poorer emotion regulation require further investigation. Although children with NLD showed difficulties in psychosocial adjustment, emotion understanding and emotion regulation compared to children without NLD, small sample size did not allow for an evaluation of the relationships between psychosocial adjustment, and emotion understanding and emotion regulation. As a result, future research should clarify the relationship between psychosocial adjustment, emotion understanding and emotion regulation among children with NLD. When this relationship is further understood, particularly through longitudinal studies, this can have further implications for prevention and intervention, as the areas of weaknesses within emotion understanding and emotion regulation could be targeted more specifically to help children with NLD improve their psychosocial adjustment.

Future research, among children with and without NLD, could investigate multiple areas of emotion understanding longitudinally to assess differences in performance among these two groups across the developmental stages. This would help control for the developmental variations in understanding and regulating emotions. Finally, further research exploring whether children with NLD can be differentiated from children without NLD on their recognition of subtle versus obvious expressions of basic emotions through a variety of verbal and nonverbal

channels would be informative. By utilizing larger samples of children, more detailed analyses can be conducted to understand differences among children with and without NLD for differing levels of intensity and type of presentation of emotions.

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Tables

Table 1

Descriptive statistics for age and the selection criteria measures, and one-tailed, univariate analyses of variance on the selection criteria measures.

	NLD (n = 10)		NA (n = 10)		<i>F</i> (1, 18)
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
VIQ	120.00	12.79	120.70	11.91	0.65
PIQ	92.30	12.89	115.00	13.38	8.48**
BD (WISC-III)	9.00	2.36	11.25	-2.05	2.23
OA (WISC-III)	7.90	3.64	12.90	-3.19	4.85*
MR (WISC-IV)	10.11	2.21	13.25	-2.43	4.33*
VIQ-PIQ mean difference (VIQ > PIQ)	27.70	13.00	5.70	11.30	7.73**
WRAT3 Reading	112.00	14.55	107.80	8.03	0.97
Grooved Pegboard Test ^a					
Dominant hand	0.71	1.34	-0.06	0.36	1.51
Nondominant hand	1.15	1.63	-0.21	0.27	8.89*
Target Test ^b	-.90	1.76	0.00	0.63	1.11

Note: NLD = Children with Nonverbal Learning Disability; NA = Normally Achieving Children; M = Mean; SD = Standard Deviation; VIQ = Verbal IQ; PIQ = Performance IQ; BD = Block Design; OA = Object Assembly; MR = Matrix Reasoning; WISC-III = Wechsler Intelligence Scale for Children – Third Edition; WISC-IV = Wechsler Intelligence Scale for Children – Fourth Edition WRAT3 = Wide Range Achievement Test – Revision 3; WIAT-II = Wechsler Individual Achievement Test – Second Edition; Reading Comp. = Reading Comprehension.

^aZ scores were reported for the Grooved Pegboard Test for the Dominant Hand and the Nondominant hand. The higher the score, the poorer the performance. ^b Z scores were reported for the Target Test. The higher the score, the better the performance.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2

Means, standard deviations and one-tailed, univariate analyses of variance for children with NLD and NA children for the subscales and DSM-oriented scales of the CBCL.

	NLD		NA		$F(1, 16)$	
	M	SD	M	SD		
CBCL Scales						
Anxious/Depressed	67.00	9.58	51.00	1.29	18.91***	.56
Withdrawn/Depressed	72.70	12.15	51.57	1.62	20.52***	.58
Somatic Complaints	62.80	10.80	52.14	2.55	6.45**	.30
Social Problems	71.30	9.26	51.86	3.08	28.17***	.65
Thought Problems	67.40	10.02	50.29	0.49	19.97***	.57
Attention Problems	70.90	11.38	51.86	1.77	18.92***	.56
Rule Breaking Behaviour	57.40	8.03	52.43	5.16	2.06	.12
Aggressive Behaviour	61.50	9.36	53.00	7.10	4.09*	.21
DSM-Oriented Scales						
Affective	66.40	8.64	50.86	2.27	21.22***	.59
Anxiety	68.20	9.10	51.00	1.41	24.12***	.62
Somatic	61.00	12.27	53.57	4.69	2.29	.13
Attention/Hyperactivity	63.60	8.93	51.86	2.55	11.25**	.43
ODD	59.00	9.01	52.14	4.41	3.43*	.19
Conduct	58.10	8.17	52.86	7.13	1.88	.11

Note: NLD = Children with Nonverbal Learning Disability; NA = Normally Achieving Children; M = Mean; SD = Standard Deviation; ODD = Oppositional Defiant Disorder; es = Effect Size

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 3

Unadjusted means, standard deviations and one-tailed, univariate analyses of covariance for children with NLD and NA children on the identification of basic emotions (both low and high intensity) through adult and child facial expressions on the DANVA.

	NLD		NA		<i>F</i> (1, 18)	es
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Happiness	10.60	1.17	11.40	.70	4.67**	.36
Anger	7.10	2.73	7.20	2.30	.00	.00
Fearfulness	8.20	1.62	8.60	2.12	.91	.10
Sadness	9.60	2.27	10.10	1.60	1.51	.15

Note: NLD = Children with Nonverbal Learning Disability; NA = Normally Achieving Children; *M* = Mean; *SD* = Standard Deviation; es = Effect Size

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 4

Unadjusted means, standard deviations and one-tailed, univariate analyses of covariance for children with NLD and NA children on the identification of basic emotions (low and high intensity combined) through adult and child paralinguistic on the DANVA.

	NLD		NA		<i>F</i> (1, 18)	es
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Happiness	8.00	2.75	8.80	2.35	.54	.06
Anger	10.00	1.63	8.90	1.29	1.35	.14
Fearfulness	8.20	1.62	8.60	2.12	.91	.10
Sadness	9.60	2.27	10.10	1.60	1.51	.15

Note: NLD = Children with Nonverbal Learning Disability; NA = Normally Achieving Children; *M* = Mean; *SD* = Standard Deviation; es = Effect Size

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 5

Unadjusted means, standard deviations and one-tailed, univariate analyses of covariance for children with NLD and NA children on the identification of basic emotions through postures on the DANVA.

	NLD		NA		<i>F</i> (1, 18)	es
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Happiness	2.70	1.06	3.20	1.03	1.00	.11
Anger	2.50	1.43	2.30	1.06	.55	.06
Fearfulness	1.50	1.51	1.90	1.37	.86	.09
Sadness	2.50	1.18	3.30	.95	1.83	.18

Note: NLD = Children with Nonverbal Learning Disability; NA = Normally Achieving Children; *M* = Mean; *SD* = Standard Deviation; es = Effect Size

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 6

Unadjusted means, standard deviations and one-tailed, univariate analyses of covariance for children with NLD and NA children on the Emotion Regulation Checklist.

	NLD		NA		<i>F</i> (1, 18)	es
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Lability/Negative	36.20	6.53	21.57	2.57	14.58**	.68
Total	22.00	2.71	28.14	4.27	8.05*	.54

Note: NLD = Children with Nonverbal Learning Disability; NA = Normally Achieving Children; *M* = Mean; *SD* = Standard Deviation; es = Effect Size

* $p < .05$, ** $p < .01$, *** $p < .001$.