THE RELATIONSHIP BETWEEN SELF-ESTEEM AND COGNITIVE DEFICITS IN SCHOOL AGE CHILDREN

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Abstract

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This project investigated self-esteem's relationship to cognition. Participants included thirty-one children (12 with learning disabilities and 19 controls) between the ages of 8 and 13. A neuropsychological evaluation including measures of self-esteem and depression were administered to each child. Regression analyses demonstrated that one component of self-esteem, Familial Acceptance, significantly predicted visual discrimination performance. When depression was added to the hierarchical regression equations, the self-esteem measures exhibited differential relationships with depression in predicting aspects of cognition. Familial Acceptance directly predicted scores on a visual discrimination task, while Peer Popularity and depression predicted performance for a measure of verbal intelligence. Conversely, Academic Competence approached significance for predicting working memory, but this relationship was mediated by depression. These preliminary findings suggest that self-esteem may be related to cognition, possibly making self-esteem and depression important areas to include in neuropsychological assessment. Further investigation is warranted, however, as the large number of analyses may have produced spurious findings.

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CHAPTER ONE

INTRODUCTION

Exploring the relationship between self-esteem and cognition is valuable as a result of limited, but promising, findings. Self-esteem, which has been defined as the value or worth placed on the self and behavior (Greenham, 1999; Harter, 1990), the way in which people perceive and value themselves (Brown & Alexander, 1991), or the degree to which a person feels their ideal self is congruent with their actual self (Coopersmith, 1967), has been associated with cognition in very few studies to date, and this research was conducted over 25 years ago.

Using the Lorge-Thorndike Intelligence Test (Lorge & Thorndike, 1954) along with Coopersmith's Self-Esteem Inventory (Coopersmith, 1967), a 50-item measure of overall self-esteem, Simon and Simon (1975) reported significant correlations between self-esteem and intelligence in a sample of 87 fifth graders. Specifically, self-esteem positively correlated with both verbal and nonverbal IQ, but verbal intelligence was more strongly associated with self-esteem. Furthermore, significant correlations also existed between self-esteem and achievement as measured by the SRA Achievement Series (Thorpe, Lefever, & Naslund, 1964). The purpose of the current study will be to expand upon these findings. Self-esteem will be evaluated utilizing a current, well normed measure for children, and its relationship to several areas of cognition will be explored.

As previously stated, limited research has looked at the relationship between self-esteem and cognition. However, it is better established that self-esteem is positively related to school achievement (Burns, 1982; Gurney, 1986; Khalid, 1990; Purkey, 1970; Simon & Simon, 1975). Specifically, a study by Lamy (as cited in Purkey, 1970) utilized

observations, interviews, and projective tests to measure 52 kindergarten children's perceptions of personal adequacy and their adequacy in dealing with the world in general. Lamy found that children's self-perceptions were as good a predictor of reading achievement in first grade as were IQ scores. Wattenberg and Clifford (1964) also demonstrated kindergartener's self-concept scores to be predictive of reading achievement in second grade. Their sample consisted of 128 children. Each was administered the Detroit Beginning First Grade Intelligence Test at the end of kindergarten as a measure of IQ, and reading achievement was measured by performance on a reading test in the classroom. In addition, children were asked to draw a picture of their families; comments children made during this time were coded into two categories: feelings of competence and feelings of personal worth. When these measures were repeated two and one-half years later, findings revealed that both areas of self-concept were predictive of reading achievement.

Children with learning disabilities (LDs) consistently report lower levels of academic self-esteem than their non-learning disabled (NLDs) counterparts (Chapman, 1988; Durrant, Cunningham, & Voelker, 1990; Gjessing & Karlsen, 1989; Huntington & Bender, 1993; Saracoglu, Minden, & Wilchesky, 1989). Just as more boys than girls suffer from LDs, more boys also report lower academic self-concepts than girls (Chapman, 1988). While 80% of LDs report that they have low levels of academic competence (Kavale & Forness, 1996), academic self-esteem was found to be the best predictor of school achievement for both LDs and NLDs (Chapman, 1988; Marsh, Smith, & Barnes, 1985).

Taken together, based upon the limited data available, research supports a direct relationship between low self-esteem and cognitive deficits as measured by IQ tests. Findings reveal a positive association between self-esteem and both verbal intelligence and nonverbal intelligence (Simon & Simon, 1975). Research also has demonstrated consistently that self-esteem is related to, and predictive of, academic achievement, particularly reading achievement (Burns, 1982; Chapman, 1988; Gurney, 1986; Khalid, 1990; Marsh, Smith, & Barnes, 1985; Purkey, 1970; Simon & Simon, 1975; Wattenberg & Clifford, 1964).

Although Simon and Simon (1975) did not speculate why self-esteem was directly related to intelligence scores, one possibility may be that children with low self-esteem experience a self-fulfilling prophecy related to poor performance. This occurs when a child's parents and/or teachers develop a negative view of the child, and, over time, the child will personally adopt that view for him or herself and perform accordingly (Berk, 2003). For example, Rosenthal and Jacobson (1966) demonstrated that teacher expectancies significantly affect student performance and gains in IQ scores. Further, a large-scale study composed of 1,539 children demonstrated that teacher underestimates of students' academic achievement potential significantly predicted future achievement (Madon, Jussim, & Eccles, 1997). Therefore, children whose potential is underestimated by either parents or teachers may experience low self-esteem and perform cognitively at a level lower than they are capable. This might occur as a result of the manner in which teachers communicate and encourage students, as teachers provide more attention and positive feedback to those students for which high expectations are held.

The relationship between general low self-esteem and depression in children and adolescents is well known (Maag & Reid, 1994; Maag & Rutherford, 1988; McGee, Anderson, Williams, & Silva, 1986; Robinson, Garber, & Hilsman, 1995; Stavrakaki, Williams, Walker, & Roberts, 1991), and, statistically, a strong correlation between the two has been found (.70-.80; Harter & Whitesell, 1996). Children who perform in the lower quartiles of reading and IQ measures have a higher likelihood of developing severe depression than children with scores in the upper quartiles (Lefkowitz & Tesiny, 1985). In addition, Blechman, McEnroe, Carella, and Audette (1986) found that a perceived lack of competence in social and scholastic domains was predictive of depression. For example, within a cognitive framework of understanding depression, low self-esteem is believed to play a critical role in developing and maintaining depression (Abramson, Metalsky, & Alloy, 1989; Beck, 1967; Becker, 1979; Rehm, 1977). Consistent with this, depressed children report lower self-esteem (Garber & Hilsman, 1992; Kaslow, Brown, & Mee, 1994; Maag & Rutherford, 1988) and lower perceptions of academic ability than those without depression (McGee et al., 1986). Maag and Rutherford (1988) state that "students' behaviors, interpersonal relationships, and academic performance [are] all important indicators of mood and ability to cope (p. 206)." Moreover, children being referred for learning disability evaluations frequently present with "depressive syndromes" (p. 206).

Although learning disabled (LD) children score significantly higher on measures of depression than controls (Branch, Cohen, & Hynd, 1995; Rodriguez & Routh, 1989), some believe they usually present with only mild levels of depressive symptomology (Greenham, 1999). However, Huntington & Bender (1993) maintain children with LDs

experience depression both more frequently and severely than NLDs. Researchers assessed children with LDs and identified 14-26% of them as severely depressed, as opposed to approximately 10% of the normative population (Goldstein, Paul, & Sanfilippo-Cohen, 1985; Stevenson & Romney, 1984). Among adolescents, 21% of those with LDs endorsed moderate to severe depression on the Beck Depression Inventory-Short Form (BDI-S; Beck & Beck, 1972; Maag & Behrens, 1989). Conversely, in a sample of 111 depressed children, Forness (1988) found that 23% of them were diagnosed with a learning disability.

To summarize, research has demonstrated that self-esteem affects academic performance and IQ and also has an association with depression. Depression also affects cognition. Thus, self-esteem may be related to cognitive performance if low self-esteem is associated with depression which, in turn, has negative ramifications for specific cognitive processes. Since limited research investigating the relationship between self-esteem and cognitive performance has been conducted and a high correlation exists between self-esteem and depression, the cognitive impairments displayed by depressed individuals served as the basis for forming some hypotheses in the current research project.

Research has associated several different cognitive deficits with depression. For example, Caine (1981) reported psychomotor slowing, inattention, slowed mental processing, diminished spontaneous verbal elaboration, and poor analysis of detail are associated with depression. Others have implicated verbal fluency, working memory, immediate recall, long-term memory, attention set shifting, and visuomotor scanning and tracking (Eves, 1996; Hart & Kwentus, 1987; Hart, Kwentus, Taylor, & Hamer, 1988;

Lamberty & Bieliauskas, 1993; Sackeim et al., 1992; Watts, Dalgleish, Bourke, & Healy, 1990).

Psychomotor Slowing/Slowed Mental Processing

Hart & Kwentus (1987) found that elderly people with depression demonstrated longer response latencies than same age peers, and these researchers concluded that inefficient decision-making plays a role in slow mental processing. A meta-analysis by White, Myerson, and Hale (1997), discovered that, across studies, depressed adult participants performed tasks 30% slower than controls. Furthermore, depressed children were found to complete a task slower, commit more errors, and be less efficient than nondepressed children (Schwartz, Friedman, Lindsay, & Narrol, 1982).

Attention/Working Memory

Attention and working memory deficits have been observed in a number of depressed adult populations. In a sample of depressed adult participants, Landrø, Stiles, & Sletvold (2001) found that levels of selective attention were significantly below those of controls. The depressed adults in Channon, Baker, and Robertson's study (1993) demonstrated reduced performance on Digit Span-Backwards from the WAIS-R (Wechsler Adult Intelligence Scale-Revised; Wechsler, 1981). In a more recent study, Ravnkilde et al. (2002) administered the WAIS Digit Span-Backwards, Subtracting Serial Sevens (Smith, 1967), and the Stroop Test (Stroop, 1935) to assess aspects of attention and working memory in depressed adult participants. All were impaired. In a test of spatial working memory, Elliott et al. (1996) found that adults with depression made more errors and employed strategies to enhance performance significantly less often than controls.

Memory

It is generally accepted that depression is related to diminished memory performance (see Johnson & Magaro, 1987; Williams, Watts, MacLeod, & Mathews, 1988), although some researchers have failed to find this association or found deficits with some aspects of memory but not others (Cipolli, Neri, Andermarcher, Pinelli, & Lalla, 1990; Mormont, 1984). These discrepant findings may be due to variations in studies, such as sample differences in type or severity of depression, treatment settings, and age of participants. The way in which memory functioning is assessed also has varied across studies. Some tasks involve verbal stimuli, whereas others utilize visual stimuli. In addition, the amount of cognitive effort required of participants to learn and recall material and the length of time between the learning and recall phases has been inconsistent, but research shows that performance of those with depression declines as demands on cognitive effort and retention interval increase (Burt, Zembar, & Niederehe, 1995).

In their meta-analysis of 99 studies on recall and 48 studies on recognition, Burt et al. (1995) established a significant, robust relationship between memory and depression in adults. Furthermore, depression and memory impairment were more strongly related in younger, rather than older, participants. In those adults with depression, immediate recall was found to be more negatively affected than delayed recall, and delayed recognition performance was more diminished than immediate recognition. (Burt et al., 1995; Williams, Watts, MacLeod, & Mathews, 1988). Williams et al. (1988) note that recognition tests tend to be less sensitive than tests of recall. Thus, recognition tasks do not differentiate groups as well and often display a non-significant

trend toward differentiation. Hart and Kwentus (1987) determined that depressed adults had better memory performance on those memory tasks that did not entail effortful encoding or retrieval, but it seems sufficient encoding may occur if material is repeatedly presented (Lamberty & Bieliauskas, 1993).

In the youth literature, Eves (1996) found depressed children demonstrated impaired immediate and delayed recall for information with low or moderate semantic organization compared to controls. However, these participants performed significantly better on tests of recognition, indicating possible retrieval difficulties. According to Whitman & Leitenberg (1990), children reporting symptoms of depression, in comparison to their peers, had poorer immediate recall of correct answers they had given. In general, children with depression perform better on visual tasks than verbal tasks (Eves, 1996). When asked to recall a verbal sequencing task with low or moderate semantic organization, children with depression performed poorly. Nonetheless, when the verbal sequencing task contained a high semantic context, depressed and nondepressed children scored equally well (Eves, 1996). Hence, children with depression may have more difficulty when material is rote as opposed to when material is meaningful and more easily encoded. Based on findings across the literature, it appears that encoding and retrieval are the primary deficits associated with depression (Ellis & Moore, 1999).

Language

Depressed adults generally display normal receptive and expressive language functioning, although some present with diminished verbal fluency (Hart, Kwentus, Taylor, et al., 1988; Lamberty & Bieliauskas, 1993; Landrø et al., 2001). Within verbal

fluency, Ravnkilde et al. (2002) observed that adults with depression had more difficulty with semantic fluency tasks than phonological fluency tasks. However, Landrø et al. attribute this deficit to a difficulty in accessing semantic memory rather than a breakdown in semantic memory itself.

Intelligence and Achievement

In the past, studies have shown that depressive symptoms in children are negatively correlated with scores on some WISC-R subtests (Kaslow, Tanenbaum, Abramson, Peterson, & Seligman, 1983), an anagram task (Kaslow et al., 1983), math and reading scores (Lefkowitz & Tesiny, 1985; Nolen-Hoeksema, Girgus, & Seligman, 1986; Strauss, Lahey, & Jacobsen, 1982), and GPA (Slotkin, Forehand, Fauber, McCombs, & Long, 1988). Vocabulary from the WISC, however, was not affected (Blumberg & Izard, 1985; Kaslow, Rehm, & Siegel, 1984; Kaslow et al., 1983) similar to other research on language functioning (Hart, Kwentus, Taylor, & Hamer, 1988; Landrø et al., 2001). In a study by McGee, Anderson, Williams, & Silva (1986), self-reported depression in 11-year-old children negatively correlated with the Arithmetic and Block Design subtests of the WISC-R. Digit Span-Forward was found not to be affected by depressed mood, while Digit Span-Backward was (Landrø et al., 2001; Ravnkilde et al., 2002). Block Design also was impaired, as was Coding and Digit Span, in a sample of first, fourth, and eighth grade children with depression (Kaslow, Rehm, et al., 1984). This suggests that while language functioning may remain intact with depression, achievement, timed tasks, and tasks involving working memory are affected.

It is well established that adults with depression score lower on the performance component of Wechsler intelligence tests than the vocabulary component (see Kluger &

Goldberg, 1990 for a review). On the WISC-R, PIQ deficits occurred in 34% of the depressed children compared to only 14% of the nondepressed children (Brumback, 1985). The reduced PIQ is believed by many researchers to be a result of the effects of psychomotor retardation on the subtests that are timed (Kluger & Goldberg, 1990).

Cognitive Dysfunction Hypotheses

Several hypotheses exist to explain the occurrence of these deficits. The first focuses on energy and motivation. It argues that because of reduced energy or motivation, those with depression do not necessarily expend the effort to generate all the responses they could although they are competent to do so. This is exemplified in studies that show the errors made by participants with depression are generally errors of omission (Watts, 1993). This may be a result of diminished output caused by a lack of energy or motivation. An alternative possibility is that those with depression are cautiously responding due to a lack of confidence in their memory abilities (Johnson & Magaro, 1987; Lamberty & Bieliauskas, 1993; Williams, Watts, MacLeod, & Mathews, 1988). As a result, it is appears in some research that people with depression display retrieval deficits. These alleged deficits may in fact be due to a lack of responding.

Next, memory problems are also theorized to result from a decreased ability to utilize effortful memory strategies. This may be due to poor sustained attention and working memory or, similar to the previous assertion, low motivation to employ such strategies (Cohen, Weingartner, Smallberg, Pickar, & Murphy, 1982; Tariot & Weingartner, 1986). For example, in a study by Eves (1996), depressed children displayed impaired effortful processing but typical automatic processing. Similarly, in Ellis, Thomas, and Rodriguez's study (1984), adults with depression exhibited

diminished recall on an effortful task, with typical recall on a simple task. Consolidation is enhanced though rehearsal (Johnson & Magaro, 1987), and failure to employ rehearsal strategies may decrease depressed participants' recall.

Although it is generally accepted that depressed participants have difficulties with encoding (Burt et al., 1995), it is unclear whether consolidation deficits exist in this population (Burt et al., 1995; Ellis & Moore, 1999; Sackeim & Steif, 1988). This is due, in part, to researchers not reporting mean recall and recognition scores (Burt et al., 1995; Zakzanis, Leach, & Kaplan, 1998), as well as some studies not measuring recognition, making determination of retrieval versus other forms of memory problems difficult to assess.

Finally, diminished attentional resources may be the source of cognitive deficits displayed in depression. If attentional resources are occupied with thinking about depressed state, the person is unable to attend to other tasks (Ellis & Ashbrook, 1988; Watts, Dalgleish, Bourke, & Healy, 1990). More cognitive and attentional resources are required for tasks involving unstructured, unorganized information (Watts et al., 1990), and in adults with clinical depression, deficits are found in memory for unstructured information. They recall less material and remember less essential information (Watts & Cooper, 1989). In a study using an episodic memory task that involved recalling target words, adults demonstrated reduced recall while in a depressed mood state (Ellis, Thomas, McFarland, & Lane, 1985). In a similar task that required memorization of letter strings, participants exhibited diminished recall and recognition (Leight & Ellis, 1981). Likewise, adults with non-clinical depression display deficits in memory for word lists that are not organized in a meaningful fashion; however, memory for structured,

meaningful material, such as stories, does not seem to be affected (Ellis & Ashbrook, 1988; Ellis & Ashbrook, 1989; Ellis et al., 1985; Sackeim & Steif, 1988).

Hence, as stated previously, there may be multiple routes by which self-esteem influences cognition. One is directly. Low self-esteem may lead to diminished cognitive functioning and academic achievement. Another route is via depression. Self-esteem may be related to reduced cognitive performance as a consequence of the high co-occurrence between low self-esteem and depression. That is, self-esteem may be associated with depression, but depression alone may be sufficient to account for the cognitive difficulties.

For the purposes of this study, self-esteem was measured and operationally defined by the Self-Esteem Index, an 80-item self-report measure for children ages 8-18 (SEI; Brown & Alexander, 1991). This measure describes self-esteem as "the way that individuals perceive and value themselves" (p. 3). Although the SEI consists of four scales, only three were used in this study, as these are the scales regularly given in our lab.

The first is Academic Competence (AC), a measure of children's perceived school performance, level of interest in and aspiration to excel academically, amount of interest and support provided by teachers, and value placed on intellectual achievement (Brown & Alexander, 1991). Next, children rate their perceived Peer Popularity (PP), which consists of their ideas on how friends, classmates, and peers think of them, their level of social and interpersonal skills, and leadership abilities (Brown & Alexander, 1991). Finally, Familial Acceptance (FA) looks at the children's perceptions of themselves as important, trusted, cared for members of their families, familial

expectations for achievement, familial expression of emotion, level of assistance, comfort, and support, and the behavioral structure implemented at home (Brown & Alexander, 1991).

The reformulated learned-helplessness model, a method of explaining the association between people's beliefs regarding their failures and whether or not they subsequently become depressed, was put forth by Abramson, Seligman, and Teasdale in 1978. According to this model, individuals with learned helplessness attribute their successes to external forces, such as luck, and their failures to internal factors, such as capability. If people do not feel their responses will affect what occurs in the future, depression, anxiety, and nonresponsiveness will result (Seligman, 1976). Furthermore, children who display learned helplessness often demonstrate low familial acceptance and have parents who set high standards but nevertheless believe their child is less capable than other children (Berk, 2003). Thus, children with low familial acceptance and high familial pressure may develop learned helplessness and depression. Familial Acceptance, therefore, may be related to cognitive performance through depression, and it is expected that this relationship will be mediated by depression more strongly than will Academic Competence or Peer Popularity.

In Dr. Kibby's current sample, these scales have been found to differentially relate to executive functioning. For example, performance on the NEPSY Tower (Korkman, Kirk, & Kamp, 1997) is positively associated with Familial Acceptance from the SEI, and it appears that this relationship is mediated by children's levels of depression and anxiety (Lancaster, Naillon, & Kibby, 2004). Conversely, a negative correlation between Perseverations on the Wisconsin Card Sorting Task (WCST; Heaton, Chelune,

Talley, Kay, & Curtis, 1993) and Peer Popularity indicates that children with more perseverative responses endorse inflated perceptions of peer popularity. Further, this correlation was not found to be mediated by depression or anxiety (Lancaster et al., 2004). These results indicate that assessment of self-esteem and mood are necessary additions to neuropsychological batteries as they are related to executive functioning skills. They also show a dissociation between aspects of self-esteem and their relationship to cognition.

Based on the preliminary data from our lab, it appears there may be two routes by which self-esteem is related to cognition. First, it appears that aspects of self-esteem may be directly linked to cognitive performance as suggested by Lancaster et al.'s (2004) unmediated relationship between peer popularity and problem-solving and the relationship between self-esteem and IQ found by Simon and Simon (1975). Second, an indirect association may exist that is mediated by depression. This route is supported by Lancaster et al.'s depression and anxiety-mediated relationship between familial acceptance and planning. It also is supported by previous research linking low self-esteem to depression and depressive affect to reduced cognitive functioning (Eves, 1996; Hart & Kwentus, 1987; Hart et al., 1988; Harter & Whitesell, 1996; Lamberty & Bieliauskas, 1993; Sackeim et al., 1992; Watts et al., 1990). Thus, self-esteem may be associated both directly and indirectly with cognitive performance, and both routes will be tested in this study.

Hypotheses

Based upon the potential direct route between self-esteem and cognition, it was anticipated that children with low self-esteem would demonstrate reduced verbal and

nonverbal intelligence, as indicated by previous research directly investigating the relationship between self-esteem and cognition. Academic achievement was not tested as approximately half the sample presents with learning disabilities in reading.

Based upon the indirect route between self-esteem and cognition, it was hypothesized that children who have low self-esteem would demonstrate reduced performance on measures of working memory, speeded processing, and learning of more effortful, unorganized verbal material. In contrast, performance on an untimed visual task was an ability not expected to be impaired, and children with low and high self-esteem were expected to be comparable on a verbal memory task that presents the material in an organized, meaningful format (passages). Based upon the research, it was anticipated that the effect size obtained for Word Lists (rote verbal material) would be moderate, whereas a small effect size for Stories (organized, meaningful material) was expected.

Finally, it was expected that the amount self-esteem uniquely predicts cognitive performance would vary by type of self-esteem assessed. In terms of individual scales, it was hypothesized that Familial Acceptance would be most associated with the indirect route. That is, the association between Familial Acceptance and cognition should be at least partially mediated by depression due to family pressure and its relationship to learned helplessness and the formation of depression. Because of this, Familial Acceptance was expected to be associated with the depressive deficits, such as working memory, rote verbal memory, and speeded performance.

The way in which Peer Popularity and Academic Competence relate to cognition, however, was not expected to be as mediated by depression. Peer Popularity should be

directly related to cognition, based upon the work of Lancaster and colleagues (2004). However, given the dearth of research on peer perception, the specific aspects of cognition to which it may be related are exploratory. Academic competence should be associated with verbal intelligence, as low levels of academic competence are hypothesized to be detrimental to gaining acquired knowledge in school. This hypothesis is also based on the literature showing a relationship between low self-esteem, verbal intelligence, and academic achievement.

CHAPTER TWO

METHODS

Participants

Participants included 31 children between the ages of 8 and 13 who took part in an ongoing research study headed by Michelle Kibby, Ph.D. at Washington State University. Written consent was provided by both parents and children before participation in the study. Participants with learning disabilities were included in the sample along with controls to allow for a better range of variability in self-esteem. Twelve children had a learning disability and nineteen were typically developing controls.

A comprehensive neuropsychological evaluation was conducted on each child, and all children included in this research project's analyses have a full-scale IQ ≥ 80. The neuropsychological evaluation measured various areas of functioning, including intelligence, achievement, attention, memory, executive, linguistic, visual perception, constructional praxis, and fine motor dexterity skills, as well as anxiety, depression, and self-esteem.

Materials

Intellectual ability.

Intellectual ability was assessed utilizing the Wechsler Intelligence Scale for Children-Third Edition (WISC–III; Wechsler, 1991). The Verbal Intelligence Quotient (VIQ) and Perceptual Organization Index (POI) scores were used to assess the relationship between self-esteem and intelligence. The Performance Intelligence Quotient (PIQ) was not used, as it is composed of the Processing Speed Index (PSI) and the Perceptual Organization Index. Research reveals that children with depressive symptoms display reduced performance for processing speed; therefore, the POI was used as the measure of nonverbal intelligence.

For the 8-13 year old age range, the WISC-III demonstrates reliability coefficients of .93-.96 for VIQ and .89-.91 for POI (Wechsler, 1991). The WISC-III also has sound validity properties (Lavin, 1996; Slate, 1995; Zimmerman & Woo-Sam, 1997), and research reveals that it is a valid assessment tool in both typically developing and learning disabled populations (Konold, Kush, & Canivez, 1997; Watkins & Kush, 2002; Wechsler, 1991).

Processing speed.

Processing speed, or the speed at which mental and motor processing occurs, was based on participants' performance on the Processing Speed Index from the WISC-III. This is a composite score of Coding and Symbol Search. Processing Speed's reliability coefficients range from .82-.87, and research consistently demonstrates that this index is a reliable and valid factor for measuring processing speed in learning disabled children and controls (Konold, Kush, & Canivez, 1997; Watkins & Kush, 2002; Wechsler, 1991).

Working memory.

Working memory is the ability to hold information on-line while manipulating it. This was measured with the working memory sequences from the Sequences subtest of the Children's Memory Scale (CMS; Cohen, 1997). These items required children to count backward from 20-1, say the months of the year backward, say the days of the week backward, and sequence alternating letters and numbers as quickly as possible. Reliability coefficients for this subtest are .81-.85 for children ages 8-13 (Cohen, 1997). The CMS demonstrates high convergent, divergent, and construct validity (Cohen, 1997; Vaupel, 2001).

Rote versus semantic memory.

Performance on the CMS Stories and Word Lists subtests (Cohen, 1997) was analyzed to determine if the relationship between memory and self-esteem differs between organized, contextually rich information and unorganized, rote material. The Word Lists subtest is a selective reminding task. That is, participants are not given the entire list of words on each trial; they are only reminded of the words they did not mention on the last trial. Thus, this measure necessitates a higher degree of executive functioning than story recall. The words also are not semantically related, making them more difficult to remember. The Stories subtest is composed of two short stories that are read to participants. Reliability coefficients for Stories are in the .71-.78 range, while Word Lists' are .81-.89. As stated above, the CMS exhibits strong validity (Cohen, 1997; Vaupel, 2001).

Visual discrimination.

Visual Discrimination, or the ability to visually compare and contrast designs, from the Test of Visual-Perceptual Skills - Revised (TVPS-R; Gardner, 1996) is a task not expected to be influenced by low self-esteem. Thus, this measure was used to test the dissociation. Reliability coefficients on this test vary between .48-.64, and studies find that it has good content, construct, and concurrent validity (Gardner, 1996).

Self-esteem.

To reiterate, self-esteem was defined in this study as the way in which people perceive and value themselves (Brown & Alexander, 1991), and it was assessed with the Self-Esteem Index (SEI; Brown & Alexander, 1991). The SEI utilizes a four-point Likert scale in which questions regarding self-esteem are answered on a continuum ranging from "always true" to "always false." For this instrument, higher scaled scores reflect higher levels of self-esteem, while lower scores indicate reduced self-esteem. Factor analysis has determined that the test contains four major factors that together account for 87% of the measure's variance, and these factors closely resemble the four scales designed for the SEI (Brown & Alexander, 1991; King & Daniel, 1996). Although it is composed of four scales, only three are used in Dr. Kibby's lab: Academic Competence, Familial Acceptance, and Peer Popularity.

The Academic Competence scale demonstrates reliability coefficients of .76-.88 for 8-13 year olds, and the Familial Acceptance scale has reliability coefficients of .75-.93 (Brown & Alexander, 1991; King & Daniel, 1996). Similarly, Peer Popularity's reliability coefficients range from .73-.84 (Brown & Alexander, 1991; King & Daniel, 1996). The Self-Esteem Index has proven valid for the assessment of self-esteem in

school age children, including learning disabled children (Bracken, Bunch, Keith, & Keith, 2000; Brooke, 1996; Callahan, 2002; Chang, 2002; Daniel & King, 1997).

Depression.

The Children's Depression Inventory (CDI; Kovacs, 1977; 1992) Total score was used to assess depression. This is a 27-item self-report measure for children ages 7-17. The CDI measures mood, anhedonia, vegetative functions, self-evaluation, and interpersonal behaviors (Kovacs, 1992). Reliability is high, with research demonstrating coefficients to be between .83-.89 (Ollendick & Yule, 1990; Smucker, Craighead, Craighead, & Green, 1986). The CDI demonstrates high levels of convergent, discriminant, concurrent, and predictive validity (Hodges, 1990; Kovacs, 1992; Mattison, Handford, Kales, Goodman, & McLaughlin, 1990).

Analyses

The learning disabled and control children were initially compared to detect any differences that occurred between groups in the self-esteem and cognitive variables. For the measures on which the groups differed, relevant analyses were conducted in the two groups separately, in addition to the combined sample, to see if the relationship between self-esteem and cognition varied between groups.

The working memory data were analyzed by calculating the sum of the raw scores on the four working memory items from the Sequences subtest: counting backward from 20-1, recalling months backward, recalling days of the week backward, and sequencing letters and numbers.

The CMS Stories and Word Lists subtests were used to assess the relationship between self-esteem and initial encoding and retrieval of rote versus contextually rich

information. It was expected that self-esteem would better predict performance on Word Lists than Stories based upon the research on depression. Specifically, it was anticipated that the effect size obtained for Word Lists would be moderate, whereas a small effect size for Stories was expected.

The processing speed variable used was the Processing Speed Index from the WISC-III. VIQ and the Perceptual Organization Index also were used from the WISC-III. A final variable, Visual Discrimination, was tested as a dissociative measure. Each of these variables' relationships to self-esteem were tested via separate regression equations.

CHAPTER THREE

RESULTS

t-tests were used to determine if those with and without learning disabilities differed in terms of the relevant self-esteem and cognitive variables (see Table 1). The groups differed on three measures: Verbal IQ [t (29) = 2.11, $p < .05$], Processing Speed [t (28) = 2.36, $p < .05$], and Sequences [t (29) = 4.32, $p < .05$]. Thus, these analyses were conducted for the two groups separately, as well as for the total sample. There were no differences between groups on Perceptual Organization, Visual Discrimination, Stories, Word Lists, CDI Total score, or any of the self-esteem scales (ps > .05).

Table 1

Group Differences

	M		SD		N	
Cognitive variable	Control	LD	Control	LD	Control	LD
VIQ	102.21	91.08	15.2	12.75	19	12

POI	101.47	101.08	12.14	9.8	19	12
PSI	99.53	87.91	10.39	16.63	19	11
Visual Discrimination	108.37	103.33	9.81	18.57	19	12
Sequences	13.11	6.67	3.94	4.21	19	12
Stories	106.05	101.67	13.39	21.88	19	12
Word Lists	91.05	85.42	20.99	14.37	19	12
CDI Total	44.05	51.42	6.88	11.76	19	12
FA	11	11.08	2.38	3.09	19	12
AC	11.89	11.08	2	3.55	19	12
PP	9.32	11	2.45	3.07	19	12

Note. VIQ = Verbal Intelligence Quotient; POI = Perceptual Organization Index; PSI = Processing Speed Index; FA = Familial Acceptance; AC = Academic Competence; PP = Peer Popularity.

Primary analyses utilized regression equations to examine whether self-esteem is related to cognitive performance. A separate regression equation was run for each of the cognitive variables, as the influence of self-esteem on cognition may vary by the type of cognition assessed. Due to small sample size, the three self-esteem variables were tested with individual regression equations to predict performance on the various cognitive tasks. They also were entered separately into equations given lab data that the various aspects of self-esteem may have differing relationships with cognition. For regression equations that consisted of only one step, Pearson correlation (*r*) values are reported.

The first set of regressions focused on Familial Acceptance. Familial Acceptance was negatively predictive of Visual Discrimination, but it was not significantly predictive

of VIQ, Perceptual Organization, Processing Speed, Sequences, Stories, or Word Lists (as shown in Table 2). Analyses were then conducted for the groups separately, but the results did not change (Table 3).

Table 2

Summary of Regression Analyses for Familial Acceptance (Entire Group)

Cognitive variable	*r*
VIQ	-.04
POI	.29
PSI	.01
Visual Discrimination	-.45**
Sequences	-.13
Stories	-.09
Word Lists	.00

Note. Familial Acceptance was entered into separate regression equations to predict each of the cognitive variables listed.

**$p \leq .01$.

Table 3

Summary of Regression Analyses for Familial Acceptance (LD and Control Groups)

Cognitive variable	*r*
VIQ	
Control group	-.29
LD group	.34

PSI	
Control group	-.25
LD group	.29
Sequences	
Control group	-.37
LD group	.11

Note. Familial Acceptance was entered into separate regression equations to predict each of the cognitive variables listed. None of the variables were significant.

Although it was slightly above the traditional significance level of $p \leq .05$, Academic Competence displayed a trend toward predicting performance on Sequences. However, VIQ, Perceptual Organization, Processing Speed, Visual Discrimination, Stories, and Word Lists were not significantly predicted by Academic Competence, as seen in Table 4. Again, results did not differ after testing the two groups individually (Table 5).

Table 4

Summary of Regression Analyses for Academic Competence (Entire Group)

Cognitive variable	*r*
VIQ	.09
POI	.17
PSI	.13
Visual Discrimination	-.03
Sequences	.34[a]

Stories	.23
Word Lists	.27

Note. Academic Competence was entered into separate regression equations to predict each of the cognitive variables listed.

[a]$p \leq .10$.

Table 5

Summary of Regression Analyses for Academic Competence (LD and Control Groups)

Cognitive variable	*r*
VIQ	
Control group	-.32
LD group	.43
PSI	
Control group	-.27
LD group	.27
Sequences	
Control group	.30
LD group	.36

Note. Academic Competence was entered into separate regression equations to predict each of the cognitive variables listed. None of the variables were significant.

Finally, Peer Popularity's relationship to cognition was assessed. Peer Popularity demonstrated a trend toward negatively predicting VIQ for the whole sample and for controls, but not for the LD sample. Peer Popularity did not predict Perceptual

Organization, Processing Speed, Visual Discrimination, Sequences, Stories, or Word Lists for either the whole group (Table 6) or either group individually (Table 7).

Table 6

Summary of Regression Analyses for Peer Popularity (Entire Group)

Cognitive variable	*r*
VIQ	-.33[a]
POI	-.18
PSI	-.19
Visual Discrimination	-.03
Sequences	-.11
Stories	-.25
Word Lists	-.19

Note. Peer Popularity was entered into separate regression equations to predict each of the cognitive variables listed.

[a]$p \leq .10$.

Table 7

Summary of Regression Analyses for Peer Popularity (LD and Control Groups)

Cognitive variable	*r*
VIQ	
Control group	-.40[a]
LD group	-.01

PSI	
Control group	-.08
LD group	-.09
Sequences	
Control group	.04
LD group	.18

Note. Peer Popularity was entered into separate regression equations to predict each of the cognitive variables listed.

[a]$p \leq .10$.

Another set of regression equations were run to examine the role of depression in the relationship between self-esteem and cognitive performance. The Children's Depression Inventory (Kovacs, 1992) Total score was entered into the equation first followed by the SEI scales on the second step (one aspect of self-esteem per analysis). These analyses helped clarify whether self-esteem accounts for a significant amount of the variance beyond depression or if self-esteem is related to cognition solely through depression. This was done for only those analyses in which self-esteem predicted, or tended to predict, an aspect of cognition.

When depression was entered into the regression equation with Familial Acceptance and Visual Discrimination, Familial Acceptance continued to account for a significant amount of the variance beyond depression. As seen in Table 8, depression did not significantly predict Visual Discrimination. Thus, it appears Familial Acceptance is directly related to this cognitive function.

Table 8

Regression Analysis for Depression, Familial Acceptance, and Visual Discrimination (Entire Group)

Variable	B	SE B	β
Step 1			
Depression	-0.19	0.26	-.13
Step 2 ($\Delta R^2 = .24$, $p \leq .01$)			
Depression	-0.34	0.24	-.23
Familial Acceptance	-2.61	0.88	-.50**

**$p \leq .01$.

When depression and Academic Competence were tested with Sequences for the whole group, depression significantly predicted the Sequences score, but Academic Competence no longer approached significance (Table 9).

Table 9

Regression Analysis for Depression, Academic Competence, and Sequences (Entire Group)

Variable	B	SE B	β
Step 1			
Depression	-0.23	0.09	-.43*
Step 2 ($\Delta R^2 = .06$, $p > .10$)			
Depression	-0.20	0.09	-.37*
Academic Competence	0.49	0.32	.26

*$p \leq .05$.

For the control group alone, neither CDI Total score nor Academic Competence predicted Sequences performance, as can be seen in Table 10. Conversely, the learning disabled group generally displayed the same pattern seen for the entire group (Table 11). Depression presented with a trend toward predicting Sequences, but there was no longer any contribution from Academic Competence. Based upon the non-significance of Academic Competence following depression being entered into the regression equation and the correlations between Academic Competence, CDI Total score, and Sequences in Table 12, it appears that depression functions as a mediating variable in the relationship between Academic Competence and Sequences.

Table 10

Regression Analysis for Depression, Academic Competence, and Sequences (Control Group)

Variable	B	SE B	β
Step 1			
Depression	-.00	0.14	.00
Step 2 ($\Delta R^2 = .10$, $p > .10$)			
Depression	0.01	0.14	.08
Academic Competence	0.63	0.49	.32

Note. None of the variables were significant.

Table 11

Regression Analysis for Depression, Academic Competence, and Sequences (LD Group)

Variable	B	SE B	β
Step 1			
Depression	-0.18	0.10	-.51[a]
Step 2 ($\Delta R^2 = .09$, $p > .10$))			
Depression	-0.17	0.10	-.48[a]
Academic Competence	0.35	0.32	.29

[a]$p \leq .10$.

Table 12

Correlations Between CDI, Academic Competence, and Sequences

Measure	1	2	3
Entire group (n = 31)			
1. CDI Total	--	-.22	-.43*
2. Academic Competence		--	.34
3. Sequences			--
LD Group (n = 12)			
1. CDI Total	--	-.13	-.51
2. Academic Competence		--	.36
3. Sequences			--

*$p \leq .05$.

When CDI Total score and Peer Popularity were entered in the regression to predict VIQ, neither variable significantly predicted VIQ on their own (see Table 13). Individually, depression approached significance, as did Peer Popularity. But when combined, these two variables significantly predicted VIQ for the whole group.

Table 13

Regression Analysis for Depression, Peer Popularity, and VIQ (Entire Group)

Variable	B	SE B	β
Step 1			
Depression	-0.52	0.28	-.33[a]
Step 2 ($\Delta R^2 = .09$, $p > .10$)			
Depression	-0.48	0.27	-.30*
Peer Popularity	-1.61	0.92	-.30*

[a] $\leq .10$.

*$p \leq .05$.

For the control group, Table 14 demonstrates that VIQ was not predicted by the depression score alone or the combination of depression and Peer Popularity, although the latter variable approached significance. In the learning disabled group, CDI Total score revealed a trend toward predicting VIQ; Peer Popularity, however, maintained its non-significant status for this group (see Table 15).

Table 14

Regression Analysis for Depression, Peer Popularity, and VIQ (Control Group)

Variable	B	SE B	β
Step 1			
Depression	0.09	0.54	.04
Step 2 ($\Delta R^2 = .17$, $p = .09$)			
Depression	-0.21	0.53	-.09
Peer Popularity	-2.67	1.49	-.43[a]

[a] $p \leq .10$.

Table 15

Regression Analysis for Depression, Peer Popularity, and VIQ (LD Group)

Variable	B	SE B	β
Step 1			
Depression	-0.61	0.28	-.56[a]
Step 2 ($\Delta R^2 = .01$, $p > .10$)			
Depression	-0.63	0.30	-.58[a]
Peer Popularity	0.45	1.16	.11

[a] $p \leq .10$.

The correlations between the CDI, Peer Popularity, and VIQ are listed for the entire group and the control group in Table 16. These correlations, along with the regression analyses mentioned above, indicate that both CDI Total score and Peer

Popularity make an independent contribution to the prediction of verbal intelligence for the combined group.

Table 16

Correlations Between CDI, Peer Popularity, and VIQ

Measure	1	2	3
	Entire group (n = 31)		
1. CDI Total	--	.09	-.33[a]
2. Peer Popularity		--	-.33[a]
3. VIQ			--
	Control Group (n = 19)		
1. CDI Total	--	-.31	.04
2. Peer Popularity		--	-.40[a]
3. VIQ			--

[a] $p \leq .10$.

As a result of the modest findings in this study, depression was directly compared to the cognitive variables to discern whether the relative lack of findings were a result of something specific to this sample. In Table 17, it can be seen that depression was significantly predictive of Perceptual Organization and Sequences, while it approached significance for VIQ and Stories. When the groups were divided (Table 18), CDI was not predictive of any cognitive variables. It should be noted, however, that children were screened for major depression and significant anxiety, and those who had such disorders

were not allowed to participate in the study. Hence, only previously undetected, mild levels of depression or anxiety were occasionally present.

Table 17

Summary of Regression Analyses for CDI (Entire Group)

Cognitive variable	*r*
VIQ	-.33[a]
POI	-.42*
PSI	-.17
Visual Discrimination	-.13
Sequences	-.43*
Stories	-.32[a]
Word Lists	-.23

Note. CDI Total score was entered into separate regression equations to predict each of the cognitive variables listed.

[a]$p \leq .10$.

*$p \leq .05$.

Table 18

Summary of Regression Analyses for CDI (LD and Control Groups)

Cognitive variable	*r*
VIQ	
Control group	.04
LD group	-.56

PSI	
Control group	.00
LD group	-.06
Sequences	
Control group	.00
LD group	-.51

Note. CDI Total score was entered into separate regression equations to predict each of the cognitive variables listed. None of the variables were significant.

CHAPTER FOUR

DISCUSSION

The aim of this project was to investigate the relationship between self-esteem and cognition in order to expand upon the very limited and dated research currently available on this topic. Previous research substantiates a direct association between low self-esteem and cognitive deficits as measured by both verbal and nonverbal IQ and measures of executive functioning (Lancaster et al., 2004; Simon & Simon, 1975). In addition, self-esteem may be related to cognition through depression (Eves, 1996; Hart & Kwentus, 1987; Hart et al., 1988; Harter & Whitesell, 1996; Lamberty & Bieliauskas, 1993; Lancaster et al., 2004; Sackeim et al., 1992; Watts et al., 1990). That is, depression may fulfill a mediating and/or moderating role between self-esteem and cognitive performance, and self-esteem may exert its own independent influence on cognition. These two possibilities were tested.

As a result of these two possible routes for which self-esteem may affect cognition, several hypotheses were formed. First, research supporting a direct

relationship between self-esteem and cognition led to the hypothesis that children with low self-esteem would demonstrate reduced verbal and nonverbal intelligence scores. Next, because of low self-esteem's association with depression, it was anticipated that children with low self-esteem would perform more poorly on measures of working memory, speeded performance, and learning and memory for more effortful, unorganized rote verbal material. This is consistent with research demonstrating that individuals with depression often display these types of deficits (Eves, 1996; Hart & Kwentus, 1987; Ravnkilde et al., 2002; White, Myerson, & Hale, 1997). However, performance on an untimed visual task and an organized, semantically meaningful verbal memory task were not expected to be impaired, as research suggests these skills are intact (Murphy, Michael, Robbins, & Sahakian, 2003).

Of the three self-esteem scales, it was expected that Familial Acceptance would be most associated with the indirect route. This was based on the concept that children simultaneously experiencing low levels of familial acceptance and high levels of familial pressure may develop learned helplessness and depression (Berk, 2003). Familial Acceptance was hypothesized to be related to the depressive deficits, such as working memory, rote verbal memory, and timed tasks. An exploratory hypothesis was formed regarding Peer Popularity. It was thought that this aspect of self-esteem may be directly related to cognition, based upon the work of Lancaster and colleagues (2004). However, due to the absence of research on peer perception, the specific aspects of cognition to which it may be related were exploratory. Last, it was anticipated that Academic Competence would be associated with verbal intelligence, since low levels of academic competence are related to deficits in gaining acquired knowledge in the academic setting.

Hypotheses

Direct route.

Self-esteem did not directly predict either verbal or nonverbal intelligence scores. However, when Peer Popularity was tested with depression, they predicted verbal intelligence for the whole group as well as the control group. This finding coincides with Simon and Simon's (1975) results in which self-esteem predicted verbal intelligence. Nonetheless, it was thought that Peer Popularity might demonstrate a direct relationship with cognition and not be associated with depression. Hence, the exploratory hypothesis regarding peer popularity was not supported. The LD group may not have demonstrated an interaction similar to the controls due to the small sample, or there may be no relationship between self-esteem and verbal intelligence for this group. Similarly, the near-significant relationships found for the entire group and the controls may not have reached significance because of low power or lack of a genuine relationship. Further research is needed to explore this relationship in both groups.

Although VIQ is not one of the more common cognitions traditionally affected by depressive symptoms in adult samples, some past research has found this relationship in children. For example, in Brumback's (1985) sample of children with depression, 28% had a PIQ at least 15 points higher than their VIQ. This percentage is significantly higher than that found in normative controls, in which one-eighth of people usually present with a VIQ deficit (Brumback, 1985). Recently, Pomerantz and Rudolph (2003) reported that children experiencing symptoms of depression or anxiety consistently underestimate their academic and social competence. This may explain how Peer Popularity could relate to depression and self-esteem. VIQ is affected by success in formal education, and it is

likely that children with greater academic competence and peer popularity will succeed in this setting.

Unlike Simon and Simon's (1975) findings, a direct relationship between self-esteem and nonverbal intelligence was not substantiated for any group. This may be a consequence of the different methods used to measure self-esteem. Simon and Simon employed the Coopersmith Self-Esteem Inventory (Coopersmith, 1967) which provides one score to represent a child's level of self-esteem. Children in the current study, however, were measured on three categories of self-esteem and were not given a global score. Thus, these distinct ways of approaching the construct of self-esteem may account for the discrepant findings. The dissimilar findings also might stem from using a different measure of nonverbal intelligence. Perceptual Organization, as opposed to Performance IQ, was used to decrease the role of processing speed in the nonverbal intelligence score. However, while reduced reliance was placed on speeded performance by using Perceptual Organization, this measure still includes timed tasks which are often affected by depression (White, Myerson, & Hale, 1997). Once again, the discrepancy in findings may be attributed to low power in the current study or lack of a significant relationship between self-esteem and nonverbal intelligence.

Indirect route.

The hypotheses related to the indirect route were generally not supported by the data. However, the indirect route revealed a trend toward Academic Competence predicting working memory, with the relationship being mediated by level of depression. It may be that low Academic Competence is linked to learned helplessness instead of Familial Acceptance, as proposed. If children are struggling academically, they might

develop a learned helpless style over time based on repeated failure in school. It is possible that this style could be initiating and maintaining depressive symptoms for these children with the result being difficulties in working memory. Contrary to the stated hypothesis, verbal intelligence was not related to Academic Competence. There may have been no statistically significant finding regarding verbal intelligence due to lack of statistical power, mild levels of depressive symptomatology and low self-esteem in the sample, or no relationship existing between these variables.

The Processing Speed Index was not associated with depression or self-esteem. It is possible that the tests comprising this index (Coding and Symbol Search) are not sufficiently sensitive to detect mild deficits in processing speed. Conversely, the severity of depression in this sample may not be sufficient to observe decreases in processing speed. In addition, the lack of findings may be due to low power or lack of a significant relationship between self-esteem and processing speed.

Verbal memory was not significantly associated with depression or self-esteem for either unorganized, rote material or meaningful passages. This could have resulted from a problematic sample size. However, it appears the effect sizes for these variables, especially rote verbal memory, are quite small. Thus, deficits in rote verbal memory may be apparent in only moderately and/or severely depressed children. Memory for passages was not associated with self-esteem, as predicted.

Although visual discrimination was not expected to be influenced by self-esteem based upon the depression research, Familial Acceptance significantly predicted performance on this task. However, depression did not predict Visual Discrimination ability, consistent with past research. Familial Acceptance was associated with Visual

Discrimination even when the depression measure was entered into the regression equation first. This suggests that the Familial Acceptance aspect of self-esteem is directly associated with Visual Discrimination and characterized by a negative relationship, indicating that higher levels of familial self-esteem are associated with worse performance on Visual Discrimination.

Good attention to detail is required to succeed on this visual discrimination task. Based on these negative results, it appears that children high in Familial Acceptance lack good attention for detail; conversely, children with low Familial Acceptance are more observant of detail. In Lancaster and colleagues' (2004) study, Peer Popularity was negatively related to problem-solving. Relatedly, one possibility is that those with executive dysfunction with concurrent deficits in attention may endorse inflated self-esteem. These children may have poorer reflective capabilities when receiving feedback from peers and family members and, as a result, possess exaggerated levels of self-esteem. Another possibility is that this is a spurious finding.

Of note, this relationship was not mediated by depression as predicted. Again, visual discrimination performance is not generally associated with feelings of depression, and this is likely the reason depression did not display an influence as a mediator or moderator.

Familial Acceptance may not have demonstrated an association with working memory, memory for rote verbal material, or speeded processing for the same reasons noted above in reference to the other self-esteem variables' lack of significant relationships: low statistical power, mild severity of depression and low self-esteem in

the sample, or there may be no relationship between self-esteem and these aspects of cognition.

Depression.

Overall, the specific hypotheses were generally not supported, especially those based on prior depression research. Because of this, it was important to investigate whether the cognitive deficits usually associated with depression were present in this sample. Although the sample did not exhibit the expected deficits in Processing Speed or Word Lists often found in adults with depression, they did demonstrate a typical performance pattern on a test of working memory, and it is likely that Perceptual Organization was affected as a result of its composite measures being timed.

Taken together, this group of children displayed selected deficits commonly seen with depression (reduced working memory and information processing speed), but their difficulties may differ from the norm to some degree for several reasons. For example, the children's overall modest levels of depressive symptomatology might have protected them from experiencing the full range of typical depressive deficits, or it may be that the cognitive difficulties found in this study are the more common neuropsychological symptoms in children at this developmental stage. It also is possible that a lack of statistical power precluded more traditional findings. The results of this sample, although limited, indicate that children experience at least some of the same deficits found in adults with depression. In addition, the association of depression and nonverbal intelligence demonstrates that depression correlated with a measure that had no relationship with any aspect of self-esteem.

Limitations

A larger sample size in this study would have helped to ensure that any relationships existing between self-esteem and aspects of cognition could be detected. For example, Academic Competence and Peer Popularity approached significance in predicting Sequences and VIQ, respectively, but did not reach the conventional $p < .05$ level. Greater statistical power would have helped to determine whether these relationships are legitimate or if they surfaced spuriously as a result of the high number of regression analyses.

More clean and easily interpretable findings may have been revealed if the degree of depression in the sample had been more extreme. The level of depression, as measured by the CDI, was limited to the mild and moderate ranges. Self-esteem was better distributed, with scores ranging from the Borderline to Very Superior ranges. Because children with the most severe mood disorders were screened out of the sample, the severity of depressive symptoms generally was within the mild range or qualified as an adjustment disorder. If more severe depression had been present, other deficits may have been evidenced, such as reduced processing speed or rote verbal memory. Furthermore, this would likely have led to even more variability in self-esteem.

Guidelines for Further Study

In order to be confident that a genuine relationship exists between Familial Acceptance and Visual Discrimination, it is important for future research to replicate this finding. Although these variables demonstrated a significant relationship, it is possible that the result is false. Thus, upcoming studies should continue to investigate whether visual discrimination abilities relate to self-esteem.

In this sample, Academic Competence demonstrated a trend toward predicting performance on Sequences for the group as a whole, but this relationship seems to be mediated and explained by depression. These findings are consistent with a multitude of studies associating depression with a working memory deficit (Channon, Baker, & Robertson, 1993; Elliott et al., 1996; Pelosi, Slade, Blumhardt, & Sharma, 2000; Ravnkilde et al., 2002), as well as recent research associating depression with reduced estimations of academic competence (Pomerantz & Rudolph, 2003). Based on the results of this study it appears that children with even mild depressive symptoms may experience a similar working memory deficit. Future research should investigate this question by assessing working memory performance in children with mild, moderate, and severe levels of depression.

Peer Popularity approached significance in predicting VIQ for the whole group. Its negative relationship with VIQ is similar to the relationship found by Lancaster et al. (2004) in which Peer Popularity negatively correlated with perseverative responses. Hence, this area warrants further exploration, as it may have ramifications for the types of interventions used with children who are experiencing difficulty with social functioning.

To clarify whether different findings emerge depending on the type of instrument used, two measures of self-esteem, one that provides a global score and one that assesses multiple aspects of self-esteem, should be administered. Alternatively, one measure that includes individual scales as well as an overall score could be utilized. In terms of nonverbal intelligence, a completely untimed measure such as the Comprehensive Test of Nonverbal Intelligence (CTONI; Hammill, Pearson, & Wiederholt, 1997) may be most appropriate for future research. This will eliminate depression's effect on speeded

processing for timed measures. Lancaster and colleagues' (2004) study indicates that other aspects of cognition may benefit from further study as well. In particular, executive functioning appears to be an important area for continued research, as planning and problem-solving were found to be significantly linked to self-esteem.

As noted above, the lack of findings in the current project may be attributable to a small sample size, reduced severity of depression and low self-esteem, or a non-existent relationship between self-esteem and cognition. First, although the sample was generally adequate for the types of analyses completed if the effect sizes were large, it may not have been sufficient for this study. Because it appears, based on preliminary findings reported in this paper, that the effect sizes for self-esteem's association with cognition may be small to moderate, a large sample with high predictive power will be necessary for future studies.

Next, it is recommended that future research focus on child populations with higher levels of depression, as it follows that these children should report reduced self-esteem as well. A group of clinic-referred children receiving treatment for depression would constitute a better sample, as these children should demonstrate lower self-esteem than that displayed by the participants in the current study. This may result in a greater amount of variance and a better test of how self-esteem relates to cognitive functioning. Furthermore, it will be important to investigate the relationship between self-esteem and cognition in children without depression. That is, research should focus on kids who endorse high and low levels of self-esteem (with no depression) to detect any cognitive functions that may be affected by self-esteem directly.

Third, this type of study may be better suited to populations that do not have any cognitive difficulties beyond those caused by depression. Children with learning disabilities, for example, may introduce confounding variables into the study if they are not separated from the control group during statistical analyses. This occurs because these kids may experience deficits that extend beyond those resulting from depression. Although the groups in this project were tested to determine which cognitions they differed on, utilizing a cleaner experimental group would help ensure that results are not influenced by unrelated deficits found in the sample.

Finally, and more parsimoniously, it may be that no relationship exists between self-esteem and cognition. Incorporating the above guidelines in future research will help to ensure that relationships, if present, are detected. If still no relationships are detected, one can be confident that self-esteem is not related to cognitive performance.

Conclusions

Based on the findings of this study, it is apparent that the cognitive difficulties related to self-esteem may vary somewhat from those present in depression. There also appears to be differing relationships between aspects of self-esteem and their corresponding cognitive deficits. Each component of self-esteem assessed demonstrated significant or near-significant links with separate aspects of cognitive functioning, and they exhibited distinct associations with depression. Familial Acceptance directly predicted visual discrimination, Peer Popularity and depression worked to predict verbal intelligence, and Academic Competence displayed a trend toward a mediated relationship with depression and working memory.

However, it is important to emphasize that only one statistically significant relationship was detected. It is possible that the association is spurious, especially when considering the high number of regression analyses utilized. This establishes a need for further investigation of this topic, including continued exploration of both possible routes by which self-esteem may affect cognition.

Although continued research is necessary for confirmation, self-esteem may be an additional component researchers and clinicians should explore when performing assessments in the future. Assessment of self-esteem and depression may assist neuropsychologists in better interpreting their testing results and ensuring comprehensive assessments are completed.

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