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TEMPERAMENT AND SCHOOL ACHIEVEMENT IN AFRICAN AMERICAN CHILDREN FROM PREDOMINANTLY LOW-INCOME FAMILIES

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TEMPERAMENT AND SCHOOL ACHIEVEMENT IN AFRICAN AMERICAN CHILDREN FROM PREDOMINANTLY LOW-INCOME FAMILIES

Ву

Mona M. Ibrahim

A DISSERTATION

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ABSTRACT

TEMPERAMENT AND SCHOOL ACHIEVEMENT IN AFRICAN AMERICAN CHILDREN FROM PREDOMINANTLY LOW-INCOME FAMILIES

By

Mona M. Ibrahim

The mechanisms underlying the relationship between child temperament and school achievement were examined. It was hypothesized that the longitudinal effect of temperament on school achievement would be mediated by academic competence, school adjustment and social skills. Data were collected over 3 school years starting in Kindergarten. Participants were 175, predominantly poor, African American children, their families, and their teachers. Data were analyzed using t-tests, path analyses, correlations, hierarchical regressions, and repeated measures analyses of variance. Results supported the majority of the hypotheses proposed in this study. When all the study variables were considered simultaneously using structural equation modeling, it became apparent that temperament was significantly related to two aspects of school functioning and that academic competence ratings were directly related to gains in academic achievement test scores. These results indicate that temperament is an important individual difference factor within the school context.

To God, the most merciful, the most kind, who has blessed me in countless ways, I dedicate my life and my work.

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Introduction

Problem Statement

Children possess characteristics of individuality which-within the framework of person-context bi-directional relations-allow them to be agents in their own development (Lerner & Lerner, 1983). Results of many studies (Carey & McDevitt, 1989; Chess & Thomas, 1986; Kohnstamm, Bates & Rothbart, 1989; Strelau, 1983) point to the importance of temperament as a key characteristic of individuality that contributes essentially to the efficiency and adequacy of human behavior in everyday life. Interindividual differences in temperament have been found to act as important factors in children's success at coping with the stressors and demands encountered in one of the key settings of life: the school (Bates, 1990; Bates, Bayles, Bennett, Ridge & Brown, 1991).

It is important to investigate the effect of temperament on <u>early</u> school experiences in particular because formative experiences during the early schooling establish the conditions for children's school performance throughout the school years. Numerous researchers have found that poor experiences in the early school years set in motion a negative chain of events (Berrueta-Clement, Schweinhart, Barnett, Epstein & Weikart, 1984; Brier, 1995; Carlson, Jacobvitz & Sroufe, 1995; Farnworth, Schweinhart &

Berrueta-Clement, 1985; Scholom & Schiff, 1980) while positive early school experiences have been linked to positive child outcomes (Carson & Bittner, 1994; Klein, 1992a; Klein, 1992b; Kohn & Rosman, 1972; Quinton & Rutter, 1988; Rutter, 1985; Rutter, 1989).

In a large cross-national study, for example, both intelligence scores and teacher's ratings in the early elementary grades were strong predictors of children's longterm educational careers (Husen, 1969). In another study (Entwisle, Alexander, Pallas & Cadigan, 1988), it was reported that school achievement patterns tend to be highly stable over time. Thus, as argued by Doris Entwisle and Karl Alexander (1993), it seems that the strongest links between risk factors and schooling are at the very beginning of the school experience. Doing better during this period is important because children are launched into achievement trajectories that then persist.

The shift from being a "home child" to being a "school child" poses many challenges to children. They go from the protective circle of the family, where they are viewed in comparison to their own selves a few months earlier, to the intensely competitive school context where they are rated in comparison to tens of other children of similar age. At the same time, when children begin school, they must adjust to the norms and expectations of the school, they must develop

strategies for acquiring and mastering the material presented at school, and they must learn to get along with their teachers and peers. How successful a child is in meeting these challenges will, no doubt, be affected by the child's temperamental characteristics and the degree to which they fit the school demands (Entwisle et al., 1988).

The critical period of transition to school is especially important to study in minority-group children. Events at the beginning school years are more important for black children's achievement gains than for those of white children (Entwisle et al., 1988). Studies have reported that African-American children have a more difficult time making the transition to full-time schooling than do white children, with difficulties greatest in the first year (Entwisle & Alexander, 1988). Studies have also indicated that compared to majority-group children, minority-group children typically receive lower ratings on behaviors related to school adjustment and academic performance. They also have a higher likelihood of becoming underachievers in school, experiencing grade retention, and dropping out of school altogether (Entwisle & Alexander, 1993). As Doris Entwisle and Karl Alexander (1988, p. 450) have stated, "To document this underachievement over and over again is not useful. Instead, the time has come to discover how the

schooling process works and what specific mechanisms are responsible for student under- or over-achievement."

The purpose of this study was to do just that; this study further examined the nature of continuities in African-American children's school performance, especially the means by which these children's temperamental characteristics affect school performance from Kindergarten to second grade. Three specific causal chains between child temperament and school achievement patterns across time were traced out in the present study. The first involves teacher's ratings of child's academic competence, the second involves child school adjustment, and the third involves child social skills.

Although teachers and the school setting, like parents and the home environment, are key factors in children's development, there has been only a limited study of the effect of temperament on school achievement in general (Gordon & Thomas, 1967; Hall, 1978; Lerner, Lerner & Zabaski, 1985; Palermo, 1982; Pullis & Cadwell, 1982) and of the mechanisms through which temperament exerts its effect on achievement in particular (Alexander, Entwisle & Dauber, 1993; Luster, Reischl, Gassaway & Gomaa, 1995). Moreover, the current literature offers little information on the relationship between temperament and school outcomes for African-American children living in low income families.

This study attempted to help fill this gap by examining the mechanisms through which child temperament can predict African-American children's scores on established measures of school achievement. It was hypothesized that temperament will exert an effect on achievement through its influence on the child's adjustment to the school setting, social skills, and academic competence.

The notion that relationships between children and their contexts are bi-directional in nature (Lerner & Busch-Rossnagel, 1981) is the key to understanding why children's temperamental characteristics should affect their school outcomes. Children bring their temperament characteristics to the school context, and, at the same time, the school context has certain properties that places a set of demands on child behavior. Thomas and Chess (1977) have described "goodness-of-fit" as a match between characteristics of the organism and demands of the environment. Some behavioral styles are more compatible with school learning than others and some evoke more favorable responses from teachers and peers than others (Keogh, 1986). When the consonance between child temperament characteristics and school demands is present, children fit in more easily and positive school outcomes result.

There are two different aspects of "goodness-of-fit" within the educational setting. One aspect has to do with

the match between temperament and curriculum demands. For example, Martin (1989) found that high achievement in math and reading in the early elementary grades was associated with high persistence, low levels of activity, and low distractibility. The presence of these qualities in the child is therefore expected to translate into higher teacher ratings of child's academic competence and higher achievement test scores.

The other aspect of goodness-of-fit within the school context relates to the match between child temperament and teacher preferences and expectations with regards to pupil behavior. For example, Keogh (1982) found that teachers' perceptions of children's teachability (i.e. children's amenability to instruction, the ease and adequacy of their interpersonal relationships, and their ability to adjust to the demands of the school) was related to the children's temperament scores. The children with "difficult" temperaments-low task orientation, low flexibility, and high reactivity-were given lower teachability scores by their teachers than other children. An "easy" temperament is therefore expected to lead to better school adjustment and higher academic and social competencies.

Longitudinally, studies have found that early school achievement is highly correlated with later school achievement. This means that, given the existence of a

relationship between temperament and school achievement, an early fit between the child and the demands of the school predisposes the child to do better in later grades as well as in early grades (Alexander et al., 1993).

Several mechanisms may underlie this relationship between temperament and later school achievement. First, the early curriculum is taught in a series of graded steps so that later material builds on earlier material. Early academic competence is related to present as well as future school achievement. Thus, if temperamental characteristics can facilitate early academic competence, temperament will, in effect, have contributed to later academic competence and school achievement as well.

Second, when children begin school, they must develop strategies for meeting the school demands. How successful their strategies are will depend, at least in part, on their temperament. The degree to which children succeed in "fitting in" will determine how positive the children's adjustment to school will be. School adjustment, which is clearly important for optimal academic performance, is a process with early adjustment making later adjustment more probable. Therefore, temperament can indirectly impact achievement over the years through its effect on early adjustment.

Finally, early interactions between children and significant others within the school will be shaped by the fit between the child's temperamental characteristics and the demands and expectations of those significant others. Interactions with peers influence the child's utilization of academic abilities (Austin & Draper, 1984; Schmuck, 1963). Thus, temperament may indirectly impact later achievement through its effect on early social skills. To sum up, the child's temperamental characteristics seem to have a longitudinal effect on academic achievement through their impact on academic competence, school adjustment, and social skills.

This study tested a model of the above described relationships between temperament, academic competence, school adjustment, social skills, and school achievement. The model, shown in Figure 1 on page 11, was tested for a group of African-American children from predominantly low income families who were experiencing the transition to school. As the model in Figure 1 shows, this study hypothesizes that child temperamental characteristics, together with initial cognitive abilities, will predict achievement scores in the later school years. Specifically, it was hypothesized that temperament will have an indirect impact on early and later achievement test scores through

its direct effects on early academic competence ratings, school adjustment, and social competence.

In the following sections, the literature supporting each of the paths in the general model proposed in this study will be discussed. Before discussing the available literature, several topics will be discussed briefly. The theoretical orientation underlying this study will be reviewed. The definition of the concept of temperament and the literature documenting its importance will also be presented. The structure of temperament as proposed by Thomas and Chess (1977) and by Buss and Plomin (1973) will also be discussed because the characteristics of temperament proposed by both pairs of researchers were used in the formulation of the Colorado Temperament Inventory-a scale which will be used in the present study to measure children's temperament characteristics. The categories of temperament proposed by Thomas and Chess (1977) will be discussed next as they provide a framework for understanding the findings of the literature on temperament and school outcomes.

An overview of the research on school demands will then be presented as this will be the basis of our evaluation of certain temperamental characteristics as representing a "difficult" or an "easy" temperament within the school context. Next, literature supporting the

assumption underlying the present study that the child's temperamental characteristics are related to child achievement will be reviewed.

Finally, studies investigating the mechanisms through which temperament impacts achievement will be reviewed. In particular, those studies investigating the relationship between temperament and school adjustment, academic competence, and social skills, as well as studies on the relationship between school adjustment, academic competence and social skills and academic achievement, will be discussed in order to provide support for each of the paths in the general model underlying this study.





Theoretical Orientation

This study draws heavily on the Goodness-of-Fit Model developed by Thomas and Chess (1977), and on the Developmental Contextual Perspective articulated by Lerner and Lerner (1983). Following is a brief discussion of each of these frames of reference.

Developmental Contextual Perspective

A major theoretical question in the temperament literature is: What variables explain the process by which temperament is linked to other inter- and intra-individual variables? From the contextual perspective, temperament has meaning for the person only as a consequence of the impact it has on the context. In order to predict when and how certain temperament attributes relate to specific aspects of psychological functioning, we need to look at the relationship between person and context (Lerner & Lerner, 1983).

This perspective involves the idea that development occurs through reciprocal relations, or "dynamic interactions" between organisms and their contexts (Lerner, 1978). A notion of integrated or "fused" levels of organization is used to account for these dynamic interactions. Variables from levels of analysis ranging from the inner-biological, through the psychological, to the sociocultural, all change interdependently across time so

that variables from one level are both products and producers of variables from the other integrated levels (Lerner, 1982). In other words, there are bi-directional relationships between individual development and contextual change.

Applied to the present study, this means that children are embedded in their school contexts. Child characteristics promote differential reactions from teachers, which may feed back to children and provide a basis for their further development. Schneirla (1957) termed these relations "circular functions". Thus, in the context of these personenvironment bi-directional relations, children's characteristics of individuality allow them to be agents in, or producers of, their own development (Lerner & Lerner, 1983).

Just as the child brings temperament characteristics to the school-child relationship, the teachers bring their own expectations and demands to the teacher-child relationship. It is these school demands that provide the functional significance for a given temperament attribute possessed by a child.

The Goodness-of-Fit Model

The "goodness-of-fit" model proposed by Stella Chess and Alexander Thomas (1978) is a conceptual model of the functional significance of temperament for an individual's psychological development. It examines the relationship between the individual child's temperament and the demands and expectations of the context. According to this model, there is a "good" fit when an individual's behavioral style enables him/her to cope successfully with the demands and expectations of the environment. On the other hand, a "mismatch" between an individual's temperament and the demands of the environment results in a "poor" fit, which leads to unfavorable developmental outcomes. Thus, a child's temperament trait can only have adverse effects on the child's development if it contributes to a poorness of fit.

A clear example of goodness versus poorness of fit has been provided by the findings of Thomas and Chess in the New York Longitudinal Study core sample (NYLS), which is primarily upper middle-class, as contrasted to the findings in a Puerto Rican working-class (PRWC) sub-sample of the NYLS. The PRWC sample families lived in the congested and underprivileged East Harlem section of New York City. Of the children (ages 9 or younger) in the PRWC sample who have received psychiatric counseling because of behavioral disorders, half had been taken to psychiatric clinics by their parents because of their high activity level. In the NYLS sample, on the other hand, only one child had been

taken by parents to a psychiatric clinic to receive counseling because of excessive activity.

Investigation of the contextual factors behind these distinct differences revealed some interesting processes. The PRWC families usually had a relatively large number of children and lived in small apartments with little space for the kinds of constructive motor activities that highly active children typically require. In addition, safe playgrounds and recreational areas were not available in the area in which these families lived. Having a highly active child, therefore, created a lot of anxiety and stress for the PRWC parents. The PRWC parents were likely to perceive high activity level in their children as a behavioral disorder that needed to be treated.

By contrast, the NYLS core-sample-families lived in spacious homes with large backyards. Their neighborhoods had safe streets and several playgrounds available for kids. The high-activity children in these families therefore were able to exercise their need for motor activity without creating stress or anxiety for their parents.

The differences in the incidence of behavior disorders in the temperamentally high-active children in these two contrasting populations was clearly due to the nature of the environmental restrictions and opportunities. The different contexts in which the children functioned made for a

goodness-of-fit for the NYLS children and a poorness of fit for the PRWC children.

The present study is an application of the concept of "goodness-of-fit" to the school-child interactions, just as Thomas and Chess and others have extensively applied it to the parent-child interactions. By assessing child temperament and looking at previous research that outlined teacher expectations and demands of the school context, it is possible to investigate the relationship between childschool fit and child outcomes.

Contextual Demands Regarding Temperament

Given the existence of what are perceived as easy and difficult temperament attributes, the question becomes: What provides a given temperament attribute with its particular meaning? Super and Harkness (1981) point out that the child's context is structured by three kinds of influences: The physical and social setting; the dominant customs in the culture; and the "psychology" of the caregivers. This psychology is termed an "ethnotheory". The term refers to caregivers' preferences and expectations regarding the meaning or significance of particular behaviors. Super and Harkness point out that not all people have the same preferences regarding temperament because every context or group holds different attitudes, values, and expectations. For example, the school setting and teachers as a group are

likely to have specific preferences for child temperament that may be different from what the home setting and parents as a group prefer.

These psychological differences in the meaning of temperament produce differences in what is regarded as a wanted or an unwanted attribute. In other words, because specific contexts, or ecological groups may differ in how much they want particular attributes, they may also differ in their ethnotheories (i.e. their attitudes and expectations) regarding the difficulty the possession of a particular temperament attribute presents for interaction.

The following chapter will include a review of the literature on the demands that the school context in particular places on the child's behavioral style. It is important to review this literature in order to specify a set of school demands against which to evaluate, in the present study, the extent to which a particular temperament characteristic "fits" the school context. But before this literature is reviewed, a discussion of the definition, importance, structure, and categories of temperament is in order.

Literature Review

Temperament

Definition of Temperament

The scientific study of temperament attributes began with Gesell's (1937) analysis of film records of children to assess characteristics such as activity level and adaptability. He concluded that "certain fundamental traits of individuality, whatever their origin, exist early, persist late and assert themselves under varying environmental conditions." Nevertheless, one of the most controversial problems regarding temperament studies today remains the notion of "temperament" itself. Some researchers regard temperament as a synonym for personality (Eysenck & Eysenck, 1969), while others confine temperament to the emotional characteristics of behavior (Goldsmith et al., 1987).

The most widely accepted definition of temperament is that of Thomas and Chess, who provided an important stimulus to research on temperament through the New York Longitudinal Study which began in 1956 and continues into the present day. They propose that temperament refers to <u>how</u> an individual does things or how he or she responds to people and to situations, rather than to <u>what</u> the individual does (i.e. the content of behavior), or to <u>why</u> he or she does it (i.e. motivation), or to the behavioral capacities or

abilities that he or she manifests (Thomas & Chess, 1977). For example, since all children eat and sleep, focus on these contents of the behavioral repertoire would not readily differentiate among them. However, children may differ in the rhythmicity of their eating or sleeping behaviors and in the activity level and quality of mood associated with these behaviors.

The question "how" refers mainly to formal characteristics of behavior, such as reactivity, activity, or self-regulation. According to Thomas and Chess (1977), Rothbart (1981), and Strelau (1987), these temperament characteristics are present since early childhood and are relatively stable throughout life.

Importance of Temperament

Many studies have tested the utility of temperament by examining its power as a key characteristic of individuality that contributes essentially to the efficiency and adequacy of human behavior in everyday life. The relevant evidence falls under two main categories. First, it has been shown that individual differences in temperament are linked to infant and child psychological health and overall functioning. For example, researchers have linked child temperament to child's resilience to stress (Werner & Smith, 1982), coping abilities (Carson & Bittner, 1994), hyperactivity (Carlson et al., 1995), self-esteem (Klein, 1992b), and self-perception (Klein, 1992a), classroom behavior (Pullis & Cadwell, 1982), academic achievement (Lerner, 1983; Martin, 1989), learning disabilities (Scholom & Schiff, 1980), and child adjustment to school (Klein, 1982a).

Second, several naturalistic and experimental studies have shown that the behavioral characteristics of children have an important effect in determining how other people respond to them. Children with different temperament features elicit different behaviors from those with whom they interact. For example, within the home setting, quality of mood has been linked to maternal responsiveness. Children with higher scores on negative mood tend to elicit less help and attention from their mothers (Dunn & Kendrick, 1980). Within the school context, studies have shown that children's temperament characteristics are related to teachers' appraisal of their intelligence. Specifically, teachers tend to overestimate the intelligence of children who react positively and quickly to new situations and to underestimate the intelligence of children who react negatively to most new situations and who require a relatively long acclimation period to change this initial response to one of full participation (Gordon & Thomas, 1967). Child temperament has also been found to be related

to observed teacher-child interactions (Paget, Nagle & Martin, 1984).

The temperament qualities brought by the child to the interactions and situations that he or she encounters therefore play an important part in determining how that encounter proceeds and in determining the overall quality of the interactions.

Structure of Temperament

Chess and Thomas (1978) identified nine components of temperament based on the New York Longitudinal Study (NYLS):

1. Activity Level - refers to descriptions of the quality of the child's motor behavior.

2. Rhythmicity - refers to the regularity of biologic functions, such as sleep-wake cycles.

3. Approach-Withdrawal - refers to a positive/negative response to a new situation, person, or environmental demand.

4. Adaptability - refers to the ease or difficulty of adapting to the requirement for change in an established behavior pattern.

5. Threshold of Responsiveness - refers to the amount of stimulation it takes to evoke a behavior.

6. Quality of Mood - rated as the preponderance of positive versus negative mood expression.
7. Intensity of Reaction - refers to the intensity of mood expression, irrespective of whether it is positive or negative.

8. Distractibility - refers to the ease or difficulty of distractibility of an ongoing activity by an extraneous stimulus.

9. Attention Span/Persistence - refers to the length of attention span and the degree of persistence with a difficult task.

Buss and Plomin (1973) proposed a temperament theory based on four aspects of personality that together constitute 'temperament.' Their selection of the personality aspects that should be called temperaments was based on three criteria. First, the personality dispositions should have adaptive value and therefore have an evolutionary history. Second, the personality dispositions should be present early in life and show some stability during childhood. Third, there should be evidence that the dispositions were inherited. On the basis of these three criteria, Buss and Plomin proposed four characteristics that make up their EASI temperament theory of personality development:

Emotionality - refers to the level of arousal,
which corresponds roughly to intensity of reaction.

 Activity - refers to the sheer amount of response output.

Sociability - refers to the tendency to approach others.

4. Impulsivity - refers to the quickness of response.

There are strengths and weaknesses to both of the theories summarized above. Evaluation of the relative merits of these two theories is beyond the scope of this research. However, both theories contributed some of the characteristics of temperament measured by the Colorado Temperament Inventory-the scale used in the present study to measure children's temperament.

Categories of Temperament

Thomas and Chess (1977) have identified, based on qualitative interpretations within the home context as well as factor-analytic techniques, three temperamental constellations:

1. Easy temperament: Comprises a combination of regularity, positive approach responses to new stimuli, quick adaptability to change in family routines, and a moderately intense positive mood. Children in this group are easy to manage; hence the term easy temperament.

2. Difficult temperament: Comprises irregularity in biological functions, negative responses to new situations or people, slow adaptability to change, and intense mood

that is predominantly negative. Parents often find such children difficult to manage; hence the term difficult temperament.

3. Slow-to-Warm-Up temperament: Comprises negative responses of mild intensity to novel situations, with slow adaptability after repeated contact.

It should be noted that, as Thomas and Chess (1977) pointed out, not all individuals fit neatly into one of these three temperamental patterns, because of the varying and different combinations of temperament traits that are possible. Nonetheless, these categories seem to capture the qualitative character of many children. They are relevant to the present study because they show that there are certain temperament characteristics that, when existing together, facilitate or impede optimal child outcomes.

Just as there are combinations of temperament characteristics that are adaptive within the home context, there are also combinations of temperament factors that make up a "teachable" child within the school context. In the next section, those combinations of temperament characteristics that facilitate optimal functioning within the school setting will be identified.

Research on School Demands

As discussed earlier, there are two possible sets of demands to consider within the school setting: curriculum demands and teacher demands. Considering the first set of demands, researchers have generally concluded that adaptable, soothable children (Holbrook, 1982; Palisin, 1986; Pullis & Cadwell, 1982; Thomas & Chess, 1977), lowactivity-level children (Martin, Drew, Gaddis & Moseley, 1988; Martin & Holbrook, 1985; Schor, 1985), and children who are high on attention span and persistence (Martin et al., 1988; Martin & Holbrook, 1985; Mevarech, 1985; Schor, 1985) are likely to be able to deal with the complex and often changing instructional demands of school. These behavioral styles appear to be particularly compatible with school learning; they facilitate learning by setting the stage for acquisition of information (Keogh, 1986).

Several researchers have investigated the question of which pupil temperament characteristics are likely to be desired by teachers. Keogh and Kornblau (1980) asked teachers to rate 82 four-year-old pupils on temperament and teachability. Teachability subsumes both cognitive and personal social characteristics and refers to teachers' perceptions of children's amenability to instruction, the ease and adequacy of their interpersonal relationships, and their ability to adjust to the demands of school. When teachers' perceptions of children's teachability based on their temperament ratings are assessed, what is being measured, in effect, is teachers' "demands" or "ethnotheories' with regard to their pupils temperament characteristics.

Keogh and Kornblau found that children rated high or low on teachability differed significantly in their temperament scores. The children who received the lowest teachability scores were low on task orientation and flexibility. In addition, teachers tended to regard slow-towarm-up children as lazy and unmotivated and to view distractible, active children as purposely uncooperative and disruptive (Keogh, 1986).

Similarly, Klein and Ballantine (1991) investigated teacher "ideals" for temperament dimensions. They asked caregivers in early childhood group care in different cultural settings to provide descriptions of their ideal for a young child's temperament. The ideal for the 22 American caregivers was low activity level, high persistence, positive mood, low distractibility, high approach, low intensity, moderate-to-high threshold, and high adaptability.

Finally, in a study by Lerner, Lerner and Zabaski (1985) which looked at the goodness-of-fit between fourthgrade students' temperaments and school demands, students with high attention span who met or exceeded the teachers' demands for attention span had higher adjustment ratings. In addition, low-reactivity students who met the teachers'

demands for this characteristic or who showed even less reactivity had better outcome scores. Similar results were also reported in other studies (Lerner, 1984; Nitz, Lerner, Lerner & Talwar, 1988).

In view of the research on school demands, it was concluded, for the purpose of the present study, that the school context demands low levels of emotionality and activity and high levels of attention span-persistence, soothability, and sociability from children. Children whose temperament characteristics match these school "ideals" or criteria for a "teachable" child, were expected to receive positive feedback from others in the school context, and thus would be well adjusted and more competent in both the academic and social domains. The same process was expected to work to the disadvantage of children in our sample whose temperamental characteristics fit poorly with these school demands.

The goal of the present study was to investigate the mechanisms underlying the relationship between temperament and school achievement. This goal presupposes that there is a relationship between the child's temperamental characteristics and school achievement. There is ample support for this supposition in the literature. Following is a review of this literature.

Research on Temperament and School Achievement

Thomas and Chess (1977) examined the relationship between temperament ratings and academic achievement for children in the New York Longitudinal Study. They looked at correlations between temperament ratings at age five and academic achievement scores in reading and math obtained at various times during the elementary school years. Achievement data consisted of all standardized tests administered in the elementary grades. They found that low adaptability and low approach ratings were significant predictors of low achievement.

In another investigation, Pullis and Cadwell (1982) studied the relationship between teachers' estimates of academic achievement and three temperament characteristics: task orientation, reactivity, and adaptability. Their sample consisted of a large number of Kindergarten, first, and second grade children. Estimations of academic achievement were found to be related to adaptability (r=.76). Factor analysis of the items designed to measure temperament revealed that adaptability and approach/withdrawal items had high loadings on the adaptability factor. Thus, their results support the findings of Thomas and Chess (1977) reviewed above.

Similarly, Holbrook (1982) looked at the relationship between school achievement and the temperament factors of

adaptability and approach/withdrawal in 117 first grade children. Adaptability was found to correlate significantly with both reading and math grades (.22 and .48, respectively). Mevarech (1985) also reported that for a sample of 87 second-graders and 104 fourth-graders high adaptability and high persistence coupled with low threshold and low distractibility were predictive of math achievement scores.

Similar relationships were reported by Schor (1985). Schor obtained ratings of child temperament from parents of seventy-nine 3-7 year olds referred for developmental assessments because of concerns about their learning or behavior in school. Compared to temperament ratings of a group of comparison children, referred children's ratings demonstrated significantly higher activity and threshold of responsiveness and lower adaptability, intensity, positivity of mood, persistence, and rhythmicity.

More support for the relationship between temperament and school achievement was provided by a 1986 study in which Klein identified 72 Kindergartners of easy, difficult, and slow-to-warm-up temperaments based on teacher and parental assessments. Klein reported that difficult children scored significantly below the others on a test of psycholinguistic abilities. Support for the relationship between temperament and achievement test scores was also provided Martin and

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Holbrook (1985) using a sample of 104 first-grade children. In their study, they found that high achievement in math and reading was associated with high persistence, low levels of activity, and low distractibility.

In a similar study, Martin and his colleagues (Martin et al., 1988) investigated the utility of temperament in predicting scores on tests of achievement over intervals of 1-4 years using a sample of 243 children ages 46-94 months. The Stanford Achievement Test, Peabody Individual Achievement test, and the Metropolitan Achievement Test were used as standardized measures of achievement. In addition, data reflecting scholastic aptitude were collected. Their results indicated that even with the effects of aptitude controlled, temperament ratings of distractibility, persistence, and activity were predictive of scores on measures of achievement over time intervals.

Finally, Palisin (1986) obtained maternal ratings of temperament for 50 preschool children on three different temperament measures including the Colorado Childhood Temperament Inventory. Intellectual achievement was measured at age 4 with three standardized achievement tests. Correlations between the temperament characteristics and achievement tests revealed that high levels of attentionspan, soothability, and persistence were significantly correlated with achievement scores. Children who were most

able to attend to tasks and to modulate their behavior performed best on achievement tests.

Thus, the overall findings of the various studies examining the relationship between temperament and achievement provide support for the assumption that temperament is an important determinant of young children's academic achievement. In particular, high levels of adaptability, attention span, and persistence and low levels of activity, emotionality, and distractibility coupled with a positive mood have been shown to be related to school achievement in several studies. Children possessing such characteristics are expected to be highly engaged in tasks resulting in high achievement scores.

Given that temperament affects achievement, the question now becomes: What specific mechanisms underlie this relationship? The present study investigated three important mechanisms through which temperament could influence school achievement. It was hypothesized that temperament affects three aspects of school functioning: academic competence, school adjustment, and social skills. Each of these aspects of school functioning, in turn, was expected to affect school achievement.

Following is a review of the literature on the relationships hypothesized in this study. Studies on the relationship between child temperament and school

functioning will be reviewed first, followed by studies on the relationship between school functioning and school achievement.

Research on Child Temperament and School Functioning

Research on the relationship between child temperament characteristics and school-related outcomes is abundant. Three areas of school functioning to which temperament seems to be particularly related are academic competence, school adjustment, and social competence. Following is a review of the literature on the relationship between temperament and each of these aspects of school functioning.

Temperament and Academic Competence

Early research by Gordon and Thomas (1967) on teacher appraisals of Kindergarten children's intelligence supports the premise that child temperament is related to teacher ratings of child academic competence. Children characterized as more approaching and more adaptable were also judged by their teachers to be more intelligent.

More recently, Pallas and his colleagues (Pallas, Entwisle, Alexander & Cadigan, 1987) examined factors that contribute to large gains in academic competence among a diverse sample of urban first graders. They found that exceptional growth in academic performance across the first grade is associated prominently with indicators of the students' temperament. They also found that higher ratings of personal maturity, or temperament, distinguished children in their sample with little initial ability who were promoted to the next grade level from others with comparable initial ability who were held back. Similar results were obtained by Talwar, Schwab, and Lerner (1989) who reported that child temperament was related to teachers' ratings of child academic competence at the end of sixth grade.

Pallas suggested that there are two ways in which temperamental characteristics could contribute to academic competence ratings by the teacher (Pallas et al., 1987). The first is a direct effect of temperament on learning. Certain temperament characteristics may act to facilitate the acquisition of knowledge by increasing the child's ability to profit from instruction and to grasp the subject matter presented at school. The second way that the child's temperament characteristics could contribute to the child's academic competence ratings is through the teachers' positive reactions to such temperamental characteristics. Teachers are likely to evaluate more favorably the children who cause the fewest problems. Similar results and reasoning were offered by other investigators (eg., (Entwisle et al., 1988)).

Furthermore, in Pallas's study, the direct positive effects of temperament on academic competence ratings were not as large in the second grade as they were in the first

grade. The investigators argued that this is to be expected because much of the temperament effects would already have been "cemented" and absorbed into the system via its impact on early academic competence trajectories.

Based on the research discussed above, it was hypothesized in the present study that child temperamental characteristics will directly affect the teacher's rating of the child's academic competence at the beginning of the child's schooling. Specifically, it was hypothesized that students with high scores on the temperament dimensions of sociability, attention-span persistence, and soothability as well as low scores on emotionality and activity will receive higher present and future academic competence ratings from their teachers. It was also hypothesized that child temperament will have an indirect longitudinal impact on later ratings of academic competence through its effect on early academic competence ratings.

Temperament and School Adjustment

Almost twenty years ago, Thomas and Chess (1977) found that school-aged children in the New York Longitudinal Study who developed behavioral problems at school were more likely than the other children without behavior problems to be viewed as high in activity level, intensity, and distractibility, and low in adaptability during the preschool years. Also in 1977, Carey, Fox, and McDevitt

studied temperament as a factor in early school adjustment. Their sample consisted of kindergarten and first-grade children. They found that adaptability and persistence were related to positive school adjustment. Highly adaptable children and children who have high persistence scores were given high adjustment scores by their teachers.

More recently, Jewsuwan, Luster, & Kostelink (1993) also looked at the relationship between temperament and positive behavioral adjustment in preschool children. Parents' perceptions of children's temperament was assessed with the Colorado Childhood Temperament Inventory, and children's behavioral adjustment in school was assessed by the children's teachers. Their sample consisted of thirty five 3-5 year old children who were attending preschool for the first time. They found that children who were highly sociable and those who were low in emotionality were perceived as well adjusted by teachers. Well-adjusted children also received higher scores on soothability and lower scores on activity level from their mothers.

Scholom, Zucker, and Stollak (1979) studied the role of infant temperament in determining child adjustment at age 4 as rated by the teacher. The sample consisted of 132 preschoolers and infant temperament was assessed retrospectively by the parents using the Carey Infant Temperament Survey. The most significant relationship

reported was that between infant girls' mood and teacher ratings of child adjustment. Girls with higher positive mood ratings received higher teacher ratings on adjustment. Other researchers (Billman & McDevitt, 1980) assessed individual temperament in a nursery school and found that highly active preschool children were involved in more conflict situations (such as rough-and-tumble play, hitting, and taking toys away from other children) and were thus perceived as less adjusted.

Helen Klein (1980, 1982) conducted a series of studies on the relationship of temperament and school adjustment. In her 1980 study she examined adjustment to community-based early childhood group care as a function of individual temperament characteristics in 43 boys and girls aged 21-60 months. Temperament was measured prior to the beginning of group care while adjustment was measured once shortly after entering group care and again after three months of group care experience. Activity level emerged as a significant predictor of both short-term and long-term school adjustment (r=.37 in both cases). In 1982, Klein sampled children from two different school settings: Head Start preschool classrooms (n=23), and Kindergarten classrooms (n=52). She found that high intensity, high threshold of responsiveness, high withdrawal from new situations, and low persistence were predictive of low adjustment ratings.

In another study, Webster-Stratton and Eyberg (1982) asked the mothers of 35 three- to four-year-olds to complete the Colorado Childhood Temperament inventory and the Eyberg Child Behavior Inventory. Correlations between the temperament of the child and child behavior problems indicated that children who were perceived by their mothers as more active and as having a low attention span tended to have more behavior problems. Similarly, Fagan (1990) reported that teachers' assessments of behavioral problems were associated with high activity level, emotionality, and distractibility.

Martin, Nagle, and Paget (1983) studied school social adjustment in the first grade. The teachers in their study rated both the child's temperament and the child's social adjustment to school. They, like Carey et al. (1977) reviewed above, found that adaptability was positively correlated with social adjustment in first grade.

Longitudinally, Caspi and his colleagues (1995) assessed relationships between early temperament and behavior problems across twelve years in an unselected sample of over 800 children. Temperament measures were drawn from behavior ratings made by examiners who observed children at ages 3, 5, 7, and 9. They found that temperament dimensions at ages 3 and 5 were correlated with adjustment problems that were independently evaluated by parents and

teachers at ages 9 and 11, and by parents at ages 13 and 15. In particular, lack of control and sluggishness were associated with fewer adolescent competencies.

Thus, as proposed by the Goodness-of-fit model, the school setting has its particular features and demands. If the features and demands of the school context are compatible with the child's temperament characteristics, then the child is perceived as well adjusted. The child whose temperament does not "fit" with the demands of the school context is rated as poorly adjusted.

Based on the assumptions of the goodness-of-fit model and the results of the studies reviewed above, it was hypothesized that children in the present study who have a "difficult" temperament will not be well adjusted to school in Kindergarten. Difficult temperament was defined, based on literature reviewed above and the literature on school demands, as a combination on low sociability, high emotionality, high activity, low attention span-persistence, and low soothability. Furthermore, the present study postulated that school adjustment at the beginning of the child's school career will be associated with high school adjustment in the later school years, and vice versa. It was, therefore, hypothesized that child temperament will have an indirect longitudinal impact on later ratings of

school adjustment through its effect on early school adjustment ratings.

Temperament and Social Skills

Thomas and his colleagues (Thomas, Chess, Birch, Hertzig & Korn, 1963) argued that timid, cautious children, like children who had frequent negative moods, would have less successful interactions with peers and would thus become less socially skillful. Results of several studies support this hypothesis and suggest a strong relationship between temperamental characteristics and the child's social skills and competencies within the school context.

For example, Attili (1990) examined temperament as an antecedent of social competence. Results indicated that children's social success at school correlated negatively with temperamental characteristics such as activity level and intensity, and positively with adaptability and mood.

In a longitudinal study (Hodgins & Koestner, 1993), infant temperament ratings were used to predict nonverbal sensitivity as a positive aspect of social skill. The results showed that children whose infant behavior was described by their mothers at age 5 as non-irritable and adaptable were more likely to display high levels of nonverbal sensitivity as 31-year-old adults. The researchers suggested that difficult temperament may be associated with a more internal focus, whereas an easier temperament is

associated with more outward-directed attention that facilitates the development of social skills.

In another study (Spangler, 1990) of the various correlates of toddlers' social competence, high perceived temperamental difficulty at 12 months was associated with the child's low social competence at age 2. Similar results were reported in another study (Barclay, 1987) examining the relationship between temperamental characteristics and social skill deficits in Kindergarten children. In that study, adaptability, sociability, and approach temperament characteristics tended to be absent or lower in children with social skill deficits. Sociable children, on the other hand, were high on persistence and low on activity and emotional intensity.

These relationships between temperament characteristics and social skills appear to hold in the late adolescent population as well. For example, in a study on 186 late adolescents (Klein, 1992b) it was reported that adaptability, attention, and persistence all showed significant correlations with social competence. Klein suggested, as Hodgins and Koestner did in the study reviewed above, that temperament may mediate how individuals perceive and experience social demands and constraints, thereby influencing the success of their social interactions.

Based upon the aforementioned findings, it was hypothesized in the present study that child temperament characteristics will be directly related to the child's social skills. Children who have an "easy" temperament that fits well with the social demands of the school context were expected to have higher social skill ratings. Easy temperament was specifically defined as a combination of high sociability, attention span-persistence, and soothability coupled with low emotionality and low activity. Furthermore, the present study postulated that high social skills ratings at the beginning of the child's school experience will be associated with high social skills ratings in the later school years, and vice versa. It was, therefore, hypothesized that child temperament will have an indirect longitudinal impact on later ratings of social skills through its effect on early social skills ratings.

The present study also hypothesized that temperament indirectly affects academic achievement through its impact on three aspects of academic functioning: academic competence, school adjustment, and social skills. In other words, it was hypothesized that the three aspects of school functioning will be affected by the child's temperament characteristics and will themselves impact academic achievement scores. Following in a review of the literature

on the relationship of each of these school functioning aspects to academic achievement.

Research on Child School Functioning and Academic Achievement

Academic Competence and School Achievement

There does not seem to be many studies in the literature on the important relationship between teachers' ratings of children's academic competence and the scores obtained by the children on tests of academic achievement. What is available, though, supports the existence of a positive relationship between the two.

In a study that tested the applicability of the Developmental Contextual Model, Talwar, Schwab, and Lerner (1989) found that temperament was related to teachers' ratings of child academic competence at the end of sixth grade, and these competence ratings were, in turn, related to child's self-rated competence which were themselves related to test-based achievement and GPA for both grades 6 and 7.

In that study it was concluded that, longitudinally, the organismic individuality-social context relations linking temperament, academic competence ratings, and school achievement at grade 6 appeared to carry over to end-ofgrade 6 and grade 7 academic achievement. Other researchers also support this longitudinal relationship. For example, Seaver (1973) found that early teacher ratings of academic competence seem to be stable over time.

Based on the studies reviewed above, it was hypothesized in the present study that academic competence ratings obtained in Kindergarten would directly predict Kindergarten gains in academic achievement test scores as well as first grade academic competence ratings. First grade academic competence ratings would, in turn, directly predict gains in academic achievement test scores in first grade as well as academic competence ratings in second grade. In other words, it was hypothesized that early academic competence would have a direct effect on early achievement test scores and an indirect effect on future achievement through its impact on subsequent academic competence.

School Adjustment and School Achievement

Karl Alexander and his colleagues (1993) examined the relationship between teacher's ratings of children's school adjustment and end-of-year performance on achievement tests. They followed a sample of 790 first graders through their fourth year of schooling in order to reveal "lasting effects" of early patterns. Their analyses across years revealed much stronger adjustment effects on achievement scores in later years than was indicated in the short term, or within-year, analyses. They argued that adjustment ratings have important effects on fourth-year achievement

scores but they are obscured by the high stability in testing patterns beyond year 1. They concluded that the total effects of adjustment ratings on achievement scores are very important and that there is a "window of opportunity" in first grade, before achievement trajectories are fully established, when good classroom adjustment helps establish early learning patterns and places children on favorable trajectories that tend to persist.

Other researchers (Ricard, Miller & Heffer, 1995; Teo, Carlso, Mathieu & Egeland, 1996) who explored the various longitudinal predictors of school achievement from Kindergarten through second grade (Ricard et al., 1995) and even through 16 years of age (Teo et al., 1996) found similar results. They have concluded that achievement was significantly related to ratings of student school adjustment. In these studies, school adjustment was shown to be a significant predictor of achievement test scores even after controlling for the effects of IQ or prior achievement.

Studies that focused on the opposite side of high achievement-i.e. school retention-have also found a link between child school adjustment and school achievement. For example, when the predictors of retention were examined (Dauber, Alexander & Entwisle, 1993) in 728 inner-city public school children attending first through fourth grade,

adjustment to school, measured before or early in grade 1, emerged as a significant predictor.

In another study (Callahan & Cowen, 1985) on school retention, 179 first through fourth graders who had been retained in their grade were compared to an equal number demographically matched non-retained children. The purpose of that study was to assess adjustment correlates of retention based on adjustment measures developed for the first- through fourth-grade age group. Results revealed that retention in grade is significantly associated with school adjustment difficulties.

Based on the findings on the relationship between school adjustment and school achievement reviewed above, it was hypothesized in the present study that school adjustment ratings obtained in Kindergarten would directly predict Kindergarten gains in achievement test scores as well as first grade school adjustment ratings. First grade adjustment ratings would, in turn, directly predict gains in achievement test scores in first grade as well as adjustment ratings in second grade. In other words, it was hypothesized that early school adjustment would have a direct effect on early achievement test scores and an indirect effect on future achievement through its impact on subsequent school adjustment.

Social Skills and School Achievement

Social skill ratings seem to be powerful predictors of academic achievement. Social skill deficits have been shown to be related to poor academic performance (Elliott, Bernard & Gresham, 1989; Fad & Ryser, 1993; Merrell, Merz, Johnson & Ring, 1992; Wentzel, 1991), while high social skills appear to be related to high scores on academic achievement tests (Walker & Hops, 1976). For example, in a study of 96 elementary school students who were rated by their teachers as either successful or unsuccessful in the school environment, Fad and Ryser (1993) reported that significant differences were found between successful and unsuccessful students on variables related to student's social relationships with peers and teachers.

Similarly, results of several studies (Merrell, 1991; Merrell et al., 1992; Vaughn, Zaragoza, Hogan & Walker, 1993) comparing social skills ratings of a group of averageachieving elementary students to a group of low-achieving peers, among other groups, indicated that the social skills of average achievers were significantly higher than those of low-achievers.

In another study (Wentzel, 1991) based on a sample of 423 12- and 13-year-old students, children who were perceived as being socially responsible, trusting of their classmates, and able to solve interpersonal problems in

adaptive ways earned higher grades than those who were not perceived as such. This finding was true even after controlling for the potentially confounding effects of IQ, ethnicity, and family structure. Thus it is possible that being socially skillful may contribute directly to students' academic accomplishments.

Another way social skills are linked to achievement is through their impact on peer acceptance/rejection. Popular children within the school were found to be the ones who were not only knowledgeable of a wide array of social interaction strategies, but also had the ability to use them appropriately (Hazen, Black & Fleming-Johnson, 1984; Kurdek & Lillie, 1985).

Being a popular child and having positive social interactions with peers, in turn, have been found to be related to high utilization of academic abilities (Austin & Draper, 1984; Schmuck, 1963). For example, Austin and Draper (1984) have reported that in their sample of 145 elementary school children, children above average in achievement were significantly more often considered amiable than rejected. Therefore, social skills seem to facilitate peer-group liking which, in turn, seems to help children create a positive image of themselves in relation to others within the school social context. This positive self image is likely to effect a positive attitude towards school and thus

lead to better utilization of academic abilities and higher achievement test scores.

Moreover, as Elliott (1989) and Fad and Ryser (1993) have found, social skills seem to be stable over time. Students seem to demonstrate similar patterns of social behavior across the school years. This means that social skill deficits in Kindergarten can be predictive of poor achievement test scores in later grades.

Based on the findings on the relationship between social skills and school achievement reviewed above, it was hypothesized in the present study that social skills ratings obtained in Kindergarten would directly predict Kindergarten gains in achievement test scores as well as first grade social skills ratings. First grade social skills ratings would, in turn, directly predict gains in achievement test scores in first grade as well as social skills ratings in second grade. In other words, it was hypothesized that early adaptive social skills would have a direct effect on early gains in achievement test scores and an indirect effect on future gains in achievement test scores through its impact on subsequent social functioning within the school context.

Summary of Hypotheses

The goal of this study was to examine the mechanisms underlying the relationship between child temperament and achievement test scores, within the framework of the goodness-of-fit model. It is hypothesized that while some of the variance in school achievement can be accounted for by initial cognitive abilities, the contribution of the child's temperament through its impact on various aspects of school functioning is also important. Figure 2 on page 52 depicts the detailed longitudinal model tested in this study. The particular hypotheses proposed in the present study are listed below.

<u>Hypothesis 1</u>: Compared to children with an easy temperament, children entering school who have a "difficult" temperament will receive lower academic competence ratings from their teachers during the Kindergarten year.

<u>Hypothesis 2</u>: Compared to children with an easy temperament, children entering school who have a "difficult" temperament will receive lower school adjustment ratings during the Kindergarten year.

<u>Hypothesis 3</u>: Compared to children with an easy temperament, children entering school who have a "difficult" temperament will receive lower social skills ratings from their teachers during the Kindergarten year.

<u>Hypothesis 4</u>: Academic competence ratings will be stable from Kindergarten to second grade.

<u>Hypothesis 5</u>: School adjustment ratings will be stable from Kindergarten to second grade.

<u>Hypothesis 6</u>: Social skills ratings will be stable from Kindergarten to second grade.

<u>Hypothesis 7</u>: Academic achievement test scores will be stable from Kindergarten to second grade.

<u>Hypothesis 8</u>: The main goal of this study is to explore the mechanisms underlying the relationship between temperament and school achievement. This goal requires that temperament be, in fact, related to school achievement in our sample. Hypothesis 8 tests this assumption. It states that mean gains in academic achievement test scores from Kindergarten to second grade will be higher for children with an easy temperament than for children with a difficult temperament.

<u>Hypothesis 9</u>: Academic competence ratings at each of the grades examined in this study (i.e. Kindergarten, first, and second grade ratings) will be related to gains in achievement test scores during that grade.

<u>Hypothesis 10</u>: School Adjustment ratings at each of the grades examined in this study (i.e. Kindergarten, first, and second grade ratings) will be related to gains in achievement test scores during that grade. <u>Hypothesis 11</u>: Social Skill ratings at each of the grades examined in this study (i.e. Kindergarten, first, and second grade ratings) will be related to gains in achievement test scores during that grade.

<u>Hypothesis 12</u>: Initial ability, as measured by achievement test scores obtained at the beginning of the Kindergarten year, will be directly related to gains in achievement test scores during the Kindergarten year.

Hypothesis 13: Temperament, academic competence ratings, school adjustment ratings, and social skill ratings will add to the prediction of gains in achievement test scores at each wave over and above initial cognitive ability.

This study used longitudinal data from two cohorts of children and their families and teachers to assess the above mentioned relationships. Four waves of questionnaires collected during Kindergarten, first grade, and second grade were employed to provide the information needed to address the questions posed in this study. A more detailed description of the procedure used to collect the data, the sample analyzed, the measures utilized, the design of the study, and the proposed analyses is presented in the following section.





Method

Sample

This study used data from an ongoing evaluation project examining the impact of a Head Start Transition Project implemented in a small Michigan school district. There are six elementary schools within this district. Schools were matched on demographics, including student population, ethnicity, single parent families, and income. As a result, two clusters of three schools each were identified. These clusters were randomly assigned to the control and the experimental conditions. Three schools served as transition program schools and the three schools.

One cluster represented 750 students in which 84% were African American, 2% were Hispanic/Latino, and 14% were non-Hispanic Whites and other races. Fifty-eight percent of these children were from single parent homes, 61% were from families which earned less than \$10,000 per year, and 27% had parents who had not received a high school diploma. The other cluster represented 695 students in which 88% were African American, 2% where of Spanish descent, 10% were White and other races. Sixty-one percent of these children were from single family homes, 62% were from families which earned less than \$10,000 per year, and 21% had parents who had not received a high school diploma.

In order to obtain the sample for the evaluation study, the names of all Head Start children were selected from all of the Kindergarten classrooms in the six schools comprising the two clusters. In addition, a more or less equal number of Kindergartners who have not attended Headstart in their preschool years was randomly selected from among the remaining Kindergarten children. As a result, 108 children were selected from both clusters for participation in the study in the Fall of 1992. These children-all kindergartners-represented the first cohort (cohort 1) to be recruited into the study. Fifty percent of these children (54 children) were selected from the comparison-schools-cluster. The other half of the cohort 1 sample was selected from the transition-schools-cluster.

In the Fall of 1993 a second cohort of children, all starting their Kindergarten year, were recruited into the study using the same procedure described above. The resulting cohort 2 sample consisted of 124 Kindergartners, 50% of whom were attending transition program schools while the other half were attending comparison schools.

The current study includes data for both cohort 1 and cohort 2 from the above described evaluation study. The sample for the present study excluded all non-African American children. The sample also excluded all children professionally identified as: mentally retarded, severely

behaviorally disordered, severely emotionally disordered, speech/language impaired, learning disabled, or developmentally delayed. This was done to ensure that children rated as highly active, highly distractible, or highly negative in mood are indeed "normal" children with a difficult temperament and not children with identified disabilities.

Subjects

The participants were 185 African American children, 86 from cohort 1 and 99 from cohort 2. Data from children as well as their families and teachers were utilized for this study. For most families (87%) the mother was the informant providing answers to the child temperament and school adjustment questionnaires. Sixty-three percent of the informants were not employed during the study. The ages of the family informants ranged from 19 years to 65 years (mean=30 years, SD=8.4 years) at the time of the initial testing.

The children in the sample had a mean age of 5.5 years (SD=.36) at the time of their initial testing at the Fall of the Kindergarten school year. The children are 50% male and 50% female. The families of these children earned incomes ranging from less than \$200/month to \$5000/month, with a mean and median income of around \$700/month and a mode income of \$500/month. It is important to point out that

while 98% of our sample can be characterized as low-income, earning incomes from \$100 or less per month to \$2000/month, not <u>all</u> the families in our sample were low-income. 1.5% (2 families) earned incomes of around \$300/month and .5% (1 family) earned an income of around \$4500/month.

Twenty-five percent of the respondents in our sample did not have a high school diploma, 33% had a high school degree or a GED, 39% had some college education, and 3% had an associate, Bachelor's, or professional degree.

Recruitment

All children were recruited into the study during the Fall of their Kindergarten year. Before any data collection occurred, parents of all children from cohort 1 and cohort 2 were contacted by the research team involved in the evaluation study. After selecting the names of potential participants, parent addresses and telephone numbers were obtained from the school district. A letter was then sent to the parents of the potential participants explaining the study. Data collectors then made personal contacts with parents in order to obtain their consent to participate in the study. At that initial contact, parents were informed of all data collection procedures involving themselves or their children. The evaluation team members informed the parents of their right to refuse participation without penalty and the procedures to protect their confidentiality. The parents
were also informed of the monetary compensation for participation in the evaluation study. Afterwards, they were invited to join the study and to sign a consent form for their own participation and for their children's participation.

Procedure

Family information that will be utilized in the current study is part of the data obtained by the evaluation project from 2-hour interviews conducted with the child's parent or legal guardian. All family interviews were faceto-face and took place in the child's home. These interviews were conducted in the Fall of the child's first year in the evaluation and in the Spring of that year as well as the Spring of the first and second grade school years. Parents who participated in these interviews were financially compensated for their time with a payment of \$20-\$40 for each 2-hour interview (Reischl & Gassaway, 1994). The interviews were highly structured and utilized measures in questionnaire form to obtain various information about the family, including those that will be used for the current study: family demographics, child temperament, and the child's adjustment to school.

Each child's teacher filled out a packet of questionnaires during the Spring of each school year. The ratings of the child's academic competence and social skills

that were used in this study's analyses were part of these teacher's packets.

The information about the child's academic achievement that was utilized in this study was part of the child data gathered by the evaluation project. Each child was individually interviewed for one hour in the Fall and the Spring of the first (i.e. Kindergarten) year and in the Spring of the following two school years. These interviews were conducted by either certified teachers or trained doctoral students working for the evaluation project who made arrangements with principals for a suitable setting for confidential individual testing within the school building. Academic achievement was assessed using the Woodcock Johnson tests of achievement and the Peabody Picture Vocabulary test.

Design

As mentioned above, the current study uses longitudinal data gathered from two cohorts of children. Each cohort was recruited to the study and given an initial assessment in the Fall of the Kindergarten school year. Each cohort was then reassessed during the Spring of that year. Another assessment occurred the following year during the Spring of the child's first grade year. A final assessment took place during the Spring of second grade. Thus, for each child data were obtained at four different points of time.

For cohort 1 the four time points are: Fall 1992, Spring 1993, Spring 1994, and Spring 1995. For cohort 2 the four data waves are: Fall 1993, Spring 1994, Spring 1995, and Spring 1996.

In order to conduct the current analyses, data from all four waves were utilized. Information about the family demographics and about the primary caregiver's perception of the child's temperament was obtained once during the initial Fall assessment. The child's teachers rated the child's academic competence and social skills and the primary caregivers evaluated their child's adjustment to school on three separate occasions: once in the Spring of the Kindergarten year and again in the Spring of the first and second grades. Information about the child's academic achievement was obtained at each of the four waves of assessment. Table 1 on page 60 shows the questionnaires used and the point(s) in time when they were obtained.

Table 1

Points in Time When Variables were Assessed for Each Cohort

		Cohor	it 1			Cohoi	ct 2	
	Τ1	T2	Τ3	Τ4	T1	Т2	$\mathbf{T3}$	Τ4
	Fall 92	Sp. 93	Sp. 94	Sp. 95	Fall 93	Sp. 94	Sp. 95	Sp. 96
Variables Assessed	(K)	(K)	(1 st)	(2 nd)	(K)	(K)	(1 st)	(2 nd)
Temperament	×				×			
Academic Competence		×	×	×		×	×	×
School Adjustment		×	×	×		×	×	×
Social Skills		×	×	×		×	×	×
School Achievement	×	×	×	×	×	×	×	×

Measures

Colorado Childhood Temperament Inventory

Each parent or primary caregiver participating in the study rated their child's temperament, or behavioral style, using the Colorado Childhood Temperament Inventory or CCTI (Rowe & Plomin, 1977). This questionnaire is a 30-item parental rating instrument for children 1-6 years of age. It combines the temperament characteristics identified by Thomas and Chess (1976, 1977, 1981) in the New York Longitudinal Study (NYLS) with the EASI dimensions of temperament identified by Buss and Plomin in their temperament theory of personality development (1975). The dimensions of the CCTI are the six factors that emerged when the items of the NYLS and the EASI were factor analyzed together. Following is a brief description of each of the six CCTI subscales.

Sociability. This subscale refers to the child's friendliness with strangers and lack of shyness.

Emotionality. This subscale refers to negative behaviors such as fussiness, crying and intense reactions.

Activity. This subscale refers to the amount or level of motor behavior displayed by the child.

Attention Span-Persistence. This subscale refers to the level of persistence on, attention to, and lack of distractibility from tasks, especially difficult ones.

Soothability. This subscale refers to the child's ability to be calmed down and to tolerate frustrations.

<u>Reaction to Food.</u> This subscale refers to the child's response to new foods.

The attention span-persistence, reaction to food, and soothability subscales of the CCTI consist primarily of items from the NYLS. The emotionality and activity subscales are made up largely of items from the EASI. And, the sociability subscale is made up of items from both the NYLS and the EASI.

Five of the CCTI subscales will be used in the present study; the reaction to food subscale was not included in the evaluation study. The respondents were presented with a 25item version of the CCTI and were asked to indicate the degree to which each statement was like the child. The response format for each item is "1" = not at all like the child; "2" = somewhat unlike the child; "3" = neither like or unlike the child; "4" = somewhat like the child; "5" = a lot like the child. An example of a CCTI item (indexing attention span-persistence) is "Child gives up easily when difficulties are encountered."

Scoring the CCTI involves forming subscale scores by summing the scores on individual items within each subscale. Each of the five subscales consists of five items. Thus, the range of possible scores for each subscale is 5-25 points.

Higher CCTI subscale scores indicate higher levels of sociability, emotionality, activity, attention spanpersistence, and soothability.

Rowe and Plomin (1977) reported internal consistency estimates (Cronbach Alphas) for the five CCTI subscales that ranged from .73 for soothability to .88 for sociability. The average one-week test-retest reliability coefficient for the CCTI was .68 and the test-retest reliabilities were moderate to high for all subscales except Soothability which had a test-retest reliability coefficient of .43. In mean analyses and factor analyses, the results were essentially the same for boys and girls and for younger children, ages 1 to 3 years, and older children who are between 4 and 7 years old (Plomin and Rowe, 1978).

Academic Competence

The teachers' judgments of the students' academic competence were assessed using the Academic Competence Scale. This questionnaire indexes the child's academic performance from the teacher's point of view. The 9 items in this scale asked the teacher to rate different aspects of the child's academic functioning in terms of how they compare with those of the other students within the child's grade level. Specifically, teachers were asked to judge the students' overall academic performance, reading and math skills both in comparison to other students and in terms of grade level expectations, overall motivation to succeed, parental encouragement to succeed, intellectual functioning, and overall classroom behavior.

Item scores range from "1" = lowest 10% in the class to "5" = highest 10% in the class. Scoring of the academic competence scale involves obtaining an overall score by averaging the scores on the nine items. Thus the range of possible scores is 1 to 5. Higher scores on this scale indicate higher child academic competence as rated by the teacher.

Child's Adjustment to School

The "Your Child's Adjustment to School" survey, or "CAS" (Reid & Landesman, 1988) was used to assess the parent's rating of their child's past and present adjustment to school. Only the six items in this scale pertaining to the child's present adjustment to school were utilized in this study. Parents or legal guardians were asked to rate, on a scale from 1-10, different aspects of their child's adjustment to school and attitudes towards school. Specifically, the parent rated how well the child is doing academically; how well the child gets along with their teacher and peers; how important school is to the child; and how much the child tries to do well in school. In addition, the parent provided a rating of the child's overall adjustment to school at the present time. Each of the six questions in this scale uses a tenchoice format with high scores indicating more or better adjustment to school. The response alternatives for the items are worded in several different ways but are all represented by a likert scale starting with "0" = not much, not very well, or not very good, and going up to "10" = a lot, extremely well, or extremely good.

An example of one of the CAS items used in the current study is "How well does your child get along with his/her teacher?" Scoring the CAS questions involves summing the scores on individual items. Thus, the range of possible scores for the CAS is 0-60 points. Higher scores indicate higher levels of school adjustment.

The internal consistency coefficients (Cronbach Alphas) for CAS are not available for a test sample. The internal consistency coefficients for the sample used in the present study will be presented later on in the results section.

Social Skills Rating System

Children's social behaviors as rated by the teacher were assessed using a modified version of the Social Skills Rating System for Teachers or SSR-T (Gresham & Elliott, 1990). In this 30-item reduced version, teachers were asked to indicate how often the child exhibited appropriate social behaviors such as sharing, helping, initiating

relationships, requesting help from others, and giving compliments. Each item was rated on a three-point scale ("0" = never, "1" = sometimes, "2" = often), with higher scores indicating higher social skills. The items in this scale include such statements as "Initiates conversations with peers."

The test-retest and interrater reliabilities of the Social Skills rating scales were investigated (Elliott, Gresham, Freeman & McCloskey, 1988) using 60 students (51 Caucasian, 7 Black, and 2 Asian) from grades 1-5 in a public school. Results indicated that the questionnaire had high test-retest reliability (r = .90) over a 6-week period. The internal consistency of the test items was generally very high. The SSR-T rated at time 1 had a coefficient alpha of .96, the SSRT-T rated at time 2 had a coefficient alpha of .95, and the SSR-T rated by observers had a coefficient alpha of .97.

Interrater reliability was examined by comparing teachers' SSR-T ratings to the observers' SSR-T ratings. The teacher-observer interrater agreement resulted in a correlation of .65 (p < .05). In addition, interobserver reliability data were obtained on the observational data gathered during the study. Interobserver reliability ranged from .63 to .90 with a mean of .77 (Elliott et al., 1988). The construct validity of the SSR-T scale was established by

comparisons with the Revised Behavior Problem Checklist and Teacher Ratings of Academic Performance.

Peabody Picture Vocabulary Test-Revised

Children's English vocabulary acquisition was measured by raw scores on the Peabody Picture Vocabulary Test-Revised or "PPVT-R" (Dunn & Dunn, 1981). This is an individually administered, norm-referenced test of hearing, or receptive, vocabulary (Bracken, Prasse & McCallum, 1984). Children were shown sets of four pictures and were asked to select one picture that best illustrates the meaning of a stimulus word presented aloud by the examiner.

The PPVT-R was standardized nationally on a carefully selected sample of 4,200 children and adolescents representative of the U.S. population according to the 1970 census. In addition, 828 adults between the ages of 19 and 40 were included in the normative sample. The test presents a broad spectrum of minorities in both the normative sample and pictured in the test plates. Standard scores are based on a national mean of 100 and a standard deviation of 15.

The PPVT-R is one of the most reliable and valid measures of verbal ability. Split-half reliabilities ranged from .67 to .88 for children and youth ages 2.5 through 18 and from .70 to .80 for 3-to-5-year-olds. Test-retest reliabilities ranged from .73 to .91. Delayed test-retest reliabilities ranged from .52 to .90. Alternate form

reliability estimates ranged from .74 to .82 for children of ages 3-5 years, and from .73 to .82 for 6-to 8-year-olds (Dunn & Dunn, 1981).

Construct validity was assessed by the correlation with vocabulary tests and the correlation with individual intelligences. Convergent validity of the PPVT-R was established in numerous studies (Sattler, 1982). The median of 55 correlations of the PPVT-R with other tests was .71. Content validity of the PPVT-R has also been established (Sattler, 1982).

Woodcock-Johnson Test Battery-Revised: Tests of Achievement

The Woodcock-Johnson Psycho-Educational Battery-Revised or "WJ-R" is comprised of the Tests of Cognitive Abilities (WJ-R COG) and the Tests of Achievement (WJ-R ACH). To assess each child's school achievements, the raw scores on the WJ-R ACH (Woodcock, 1990) was used. This test was developed by Richard W. Woodcock and Mary Bonner Johnson in two forms: Form A and Form B. The two forms are parallel and matched for content. For the current study, Form A was used in the initial Fall assessment and Form B was used subsequently. The use of both Forms of the WJ-R ACH allows alternated use of the test to measure achievement while reducing the effects of familiarity with test items on performance. Test items are presented visually, orally, or with both modalities concurrently, using timed and untimed

formats requiring either oral or written responses. Examiners supplied a stopwatch and pencils. Each test provides basal and ceiling levels involving the six lowest items passed or the six highest items failed, respectively.

The WJ-R ACH, Forms A and B, consists of nine tests in the Standard battery. For the present study a subset of the WJ-R ACH composed of four tests was administered. The tests contained items arranged in order of difficulty. Each test involved presenting the child with items until the child is no longer able give the right answers. Following is a description of each of these four tests.

Letter-Word Identification. This test is comprised of 57 items assessing children's symbolic learning and reading identification skills. Children were asked to identify letters and words written on the test booklet page. For example, children were asked to identify the word "the" by saying it aloud.

Passage Comprehension. This test contains 43 items assessing children's comprehension ability. The first four items use a multiple-choice format to match a picture with a phrase. In the remainder of the test, children were asked to silently read a passage and identify the appropriate word missing from the passage.

<u>Calculation</u>. This mathematics computation test is made up of 58 mathematical problems. The problems included addition, subtraction, and multiplication.

Applied Problems. In this 60-item test, mathematical word problems were presented. Solving the problems required that the child be able to distinguish essential from trivial details. Items also required the child to decide about the specific arithmetic procedures required to reach a solution.

An extensive set of statistical and empirical data supports the psychometric integrity of the WJ-R (Prewett & Gannuli, 1991). Several pilot studies were used for item development and selection. Items and test data were analyzed at four points during development, with large sample sizes at each point. Decisions concerning the specific tests comprising each cluster were made on the basis of the results of exploratory and confirmatory factor analysis, cluster analysis, and multiple regression analysis (McGrew, Werder & Woodcock, 1991). The norm group consisted of 6,359 children from over 100 communities in the U.S.

Internal consistency for each of the four tests used in the current study was established using the split-half procedure adjusted for length by the Spearman-Brown correction formula. Most reliability coefficients fall in the .80 to .95 range. Content validity for each of the four tests used in the present study was established by

consulting with outside experts, curriculum consultants, and experienced teachers. Performance on the WJ-R ACH tests was correlated with other educational achievement test scores. Many of the reported correlations fell in the moderate and higher range, thus supporting the concurrent validity of the WJ-R ACH tests.

Discriminant validity was established using discriminant function analysis which yielded results indicative of the utility of the WJ-R in distinguishing among gifted, normal, learning disabled, and mentally retarded students. Finally, the WJ-R test scores were correlated with each other at age levels 2, 4, 6, 9, 13, 18, 30-39, 50-59, and 70-79 years. Low to moderate between-test correlations were obtained at each age level, which supports the construct validity of the battery (McGrew et al., 1991).

Results

Missing Data Estimation

A careful examination of the data set revealed that 38 cases had at least one of the variables of interest in the present study missing. Because unequal sample sizes across analyses can bias parameter estimates and measures of central tendency (Roth, 1994) as well as threaten the power of a test to detect real differences (Cohen, 1988), the missing data were estimated prior to hypothesis testing.

The original data set for the present analyses consisted of 185 children. A selection rule was established whereby it was decided that missing data will be estimated only for cases that 1) are missing values for 30% or less of the variables assessed in the present study, and 2) are missing no more than one of the three main waves of data (T2, T3, T4) used in this study. Of the 185 children, 10 were missing more than one wave of data. These 10 cases were also the only ones missing more than 30% of the variables. Therefore, these 10 cases were omitted from the present sample.

A test for selection bias, using an analysis of variance design for excluded versus retained cases, revealed that the 10 excluded cases did not significantly differ from the cases retained on any of the study variables except a

variable that indicates the number of times the family moved, which was expected.

A chi-square test of independence in a two-way contingency table was then carried out on the data collected from the remaining 175 children to assess whether missingness occurs at random across variables or not (Kim & Curry, 1977). This test revealed that the observed pattern of missing data fits the pattern that would be expected to emerge if the data were missing in a random fashion.

Different data imputation strategies were then used to generate estimates and replace missing values. For variables with three repeated measures (academic competence, school adjustment, social skills), interpolation of the two available points of the same variable was used to estimate the missing value. For example, academic ratings at T2 and T4 for a given case were averaged to estimate the missing academic rating at T3 for that case. This method was chosen because it was ranked highest in terms of minimizing bias in repeated measures designs (Roth, 1994).

Preliminary descriptive analyses of the academic achievement variables, which were measured at four different waves, revealed that the distributions for some of the achievement tests were extremely positively skewed at both T1 and T2. Six cases had missing values for these tests at T1 (no cases had missing achievement scores at T2).

Extrapolation of missing values for these cases could have biased their scores at Tl upwards.

Therefore, a different strategy was used to estimate missing achievement test scores (Bingham, 1996). First, the group mean and standard deviation was calculated for each achievement test at each of the 4 waves. Second, a standard score was computed (for each case with missing values) at the next closest wave. This standard score was then used to estimate the missing test score.

Missing T1 achievement scores were thus estimated from the equally positively skewed T2 standard scores. For missing T3 (or T4) scores, T4 (or T3) standard scores were used in the estimation procedure. For example, to estimate a child's missing Woodcock Johnson comprehension test score at T1, that child's comprehension score at T2 was calculated in standard units. The missing T1 comprehension score was then estimated by multiplying the T2 standard score by the T1 group standard deviation and adding the resulting number to the T1 group mean.

Following the longitudinal data estimation, the data set was examined for scales that were measured only at T1 that remained missing. Three cases, out of the 175, did not have temperament data. For these 3 cases, regression substitution for missing values was used. According to Little and Rubin (1987), this method is an accurate,

conservative procedure for coping with missing data. Several predictor variables that significantly correlated with the temperament scale score were identified. Scores for each of the 3 missing cases were then estimated using these predictor variables. Care was taken that none of the selected predictor variables came from the set of variables constituting the model tested in this study. Such an approach ensures that data estimation would not artificially increase the relationships under investigation (Roth, 1994).

The remaining missing values were all demographic variables measured at the beginning of the study. 70 data values out of a possible 4550 values for all demographic variables for the 175 cases were missing. Because there is little difference in the parameter estimates and answers to research questions resulting from the various data estimation techniques when less than 10% of the data are missing in a random pattern (Roth, 1994), these missing data values (which represent only 1.5% of the data) were estimated using the simple mean substitution method.

Assessment of Measures

The factor structure of each of the predictor measures used in this study was examined using confirmatory factor analysis. In all, four different confirmatory factor analyses were run using LISREL 8: one for the Colorado Temperament Inventory, one for the Academic Competence

Ratings Scale for Teachers, one for the Child Adjustment to School questionnaire for Parents, and one for the Social Skills Rating system for teachers.

Figure 3 through Figure 6, on pages 78 through 81 below, show the measurement model tested for each of the four questionnaires as well as the fit indices for each model. As can be seen from the fit indices, the measurement models fit the data reasonably well. All the paths in each model were significant confirming that items within each scale are good indicators of the latent construct represented by that scale.

In order to allow comparisons between children with easy temperament and those with difficult temperament, a composite variable, labeled "Overall Temperament," indexing easy temperament versus difficult temperament, was created. The variable was created by combining five of the temperament subscales: sociability, emotionality, activity, attention span-persistence, and soothability. The variable had values ranging from 1=not at all like my child to 5=very much like my child. The children were then divided into two groups-those with an average temperament rating of more than 3 and those with an average rating of 3 or less.

There are 96 Children in the first group (54.9 % of the sample) and 79 children in the second group (45.1 % of the sample). The temperament of the children in the first

group was labeled "easy" and was characterized by high sociability, attention span-persistence, and soothability combined with low emotionality and low activity. The temperament of the children in the second group was labeled "difficult" and was characterized by low sociability, attention span-persistence, and soothability combined with high emotionality and high activity.

The internal consistency of each of the scales used in the present study were examined for each of the data waves using coefficient alpha internal consistency estimates. The Alphas ranged from .56 to .96 and were generally high. The Alphas are reported in Table 2 on page 82 along with the number of items that make up each scale.





RMSEA= .07 AGFI= .77 NNFI= .65

p= .00













Table 2

Reliability Estimates for Scales (n=175)

			Alpha	(α)	
Scale	Number of Items	T1	Τ2	T3	T4
Overall Temperament	25	.59	NA	NA	NA
Temperament: Sociability	5	. 66	NA	NA	NA
Temperament: Emotionality	5	.76	NA	NA	NA
Temperament: Activity	5	.58	NA	NA	NA
Temperament: Persistence	5	.56	NA	NA	NA
Temperament: Soothability	5	.70	NA	NA	NA
Academic Competence	6	NA	.96	.95	.94
School Adjustment	9	NA	.75	.86	.86
Social Skills	30	NA	.96	.96	.95

NA = Scale not assessed at that Wave

Descriptive Analyses

Descriptives were obtained for all the measures used in the study and for some of the demographic variables of interest. Means and standard obtained for each of the variables are presented in Table 3 on page 85. As reported earlier in the sample section, the children in this study mainly come from low-income families with a limited educational background.

The bivariate relationships between all study variables were examined using bivariate correlational analyses. The resulting intercorrelation matrix is presented in Table 4 starting on page 86. Examination of these intercorrelations revealed that exposure to the Head Start Transition program was not significantly related to the demographic variables nor to the majority of variables of interest in the present study. Only three variables, out of a possible 32, were related to program exposure; and even then these relationships were not systematic over time.

For example, program exposure is related to only two of the five tests of achievement at T2, but it is not significantly related to these 2 achievement tests or to any other achievement test at any of the other data waves. Consequently, for the present study children from both experimental, or transition-program, schools and comparison

schools were included in the subsequent analyses as a single group of children.

	E1	1	H	2	Т	e	H	4
Scale	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Overall Temperament	3.07	.40	NA	NA	NA	NA	NA	NA
Academic Competence	NA	NA	3.12	1.11	3.24	1.10	3.15	1.09
School Adjustment	NA	NA	8.46	1.16	8.16	1.62	7.64	1.69
Social Skills	NA	NA	1.31	.41	1.34	.41	1.25	.43
WJ: Letter-Word Identification	7.17	3.07	10.16	.29	18.23	5.69	25.26	7.22
WJ: Comprehension	.72	1.08	. 66	1.15	6.58	4.52	12.26	5.88
WJ: Calculation	.25	1.40	.50	1.18	6.17	3.23	10.60	4.21
WJ: Applied Problems	11.73	3.87	13.85	3.82	21.07	3.77	25.03	3.73
Peabody Picture Vocabulary	35.75	12.74	48.30	14.56	62.34	13.23	71.73	13.85

Descriptives for Scales (n=175)

Table 3

NA = Scale not assessed at that Wave

Table 4

Intercorrelations Among Variables Used in the Study (n = 175)

	Measure	1	2	3	4	5
н.	Program Exposure					
2.	Informant's Education Level	0.12				
Э.	Family Income	-0.01	0.25**			
4.	Child Temperament	-0.01	0.03	-0.04		
5.	Child Academic competence at T2	0.07	0.18*	0.22**	0.18*	
.9	Child Academic competence at T3	0.03	0.14	0.16*	0.18*	0.60**
7.	Child Academic competence at T4	0.05	0.07	0.10	0.16*	0.42**
. 8	Child Adjustment to School at T2	-0.03	0.13	0.06	0.17*	0.35**
9.	Child Adjustment to School at T3	-0.06	0.13	0.13	0.19*	0.33**
10.	Child Adjustment to School at T4	-0.10	0.08	0.01	0.18*	0.21**
11.	Child Social Skills at T2	0.00	0.17	0.24**	0.22**	0.77**
12.	Child Social Skills at T3	-0.11	0.07	0.22**	0.13	0.42**
13.	Child Social Skills at T4	-0.16*	0.00	0.12	-0.02	0.23**
14.	W-J Letter-Word Identification at T1	-0.12	0.10	0.18*	0.14	0.57**
15.	W-J Passage Comprehension at T1	0.09	-0.02	-0.04	-0.01	0.04
16.	W-J Calculation at T1	-0.04	0.11	0.07	0.13	0.15*
17.	W-J Applied Problems at T1	0.02	0.15	0.07	0.14	0.48**

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	Measure	-1	2	ю	4	5
18.	Peabody Picture Vocabulary at Tl	0.09	0.28**	0.10	0.06	0.48**
19.	W-J Letter-Word Identification at T2	-0.17*	0.02	0.11	0.18*	0.50**
20.	W-J Passage Comprehension at T2	-0.09	0.04	0.12	-0.03	0.13
21.	W-J Calculation at T2	0.03	0.05	0.08	0.12	0.20**
22.	W-J Applied Problems at T2	0.00	0.10	0.15	0.11	0.52**
23.	Peabody Picture Vocabulary at T2	0.16*	0.22**	0.07	0.13	0.45**
24.	W-J Letter-Word Identification at T3	0.01	0.13	0.15*	0.17	0.53**
25.	W-J Passage Comprehension at T3	0.02	0.14	0.12	0.15*	0.52**
26.	W-J Calculation at T3	-0.10	0.06	0.12	0.33**	0.45**
27.	W-J Applied Problems at T3	-0.06	0.16*	0.17*	0.21**	0.57**
28.	Peabody Picture Vocabulary at T3	0.12	0.29**	-0.02	0.09	0.43**
29.	W-J Letter-Word Identification at T4	0.05	0.18*	0.15*	0.21**	0.58**
30.	W-J Passage Comprehension at T4	0.12	0.20**	0.11	0.23**	0.55**
31.	W-J Calculation at T4	0.03	0.21**	0.17*	0.09	0.47**
32.	W-J Applied Problems at T4	-0.04	0.23**	0.17*	0.19*	0.53**
33.	Peabody Picture Vocabulary at T4	0.15	0.20**	0.08	0.15	0.45**

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	Measure	9	۲	8	б	10	11
ч.	Program Exposure						
2.	Informant's Education Level						
т	Family Income						
4.	Child Temperament						
5.	Child Academic competence at T2						
.9	Child Academic competence at T3						
7.	Child Academic competence at T4	0.65**					
в	Child Adjustment to School at T2	0.24**	0.22**				
9.	Child Adjustment to School at T3	0.47**	0.35**	0.34**			
10.	Child Adjustment to School at T4	0.19*	0.35**	0.34**	0.43**		
11.	Child Social Skills at T2	0.52**	0.36**	0.35**	0.31**	0.22**	
12.	Child Social Skills at T3	0.61**	0.51**	0.32**	0.55**	0.38**	0.45**
13.	Child Social Skills at T4	0.32**	0.61**	0.22**	0.26**	0.34**	0.27**
14.	W-J Letter-Word Identification at Tl	0.55**	0.45**	0.20**	0.30**	0.18*	0.42**
15.	W-J Passage Comprehension at T1	0.04	0.11	-0.02	-0.06	0.01	-0.06
16.	W-J Calculation at Tl	0.22**	0.23**	0.06	0.10	0.15*	0.13
17.	W-J Applied Problems at Tl	0.39**	0.32**	0.20**	0.20**	0.11	0.36**

	Measure	6	L	8	6	10	11
18.	Peabody Picture Vocabulary at Tl	0.36**	0.32**	0.17*	0.19*	0.17*	0.32**
19.	W-J Letter-Word Identification at T2	0.55**	0.51**	0.31**	0.36**	0.23**	0.36**
20.	W-J Passage Comprehension at T2	0.07	0.10	0.05	0.22**	0.15*	0.09
21.	W-J Calculation at T2	0.24**	0.21**	0.10	0.13	0.09	0.09
22.	W-J Applied Problems at T2	0.44**	0.36**	0.22**	0.23**	0.15	•**0
23.	Peabody Picture Vocabulary at T2	0.29**	0.32**	0.11	0.13	0.12	0.30**
24.	W-J Letter-Word Identification at T3	0.64**	0.56**	0.23**	0.36**	0.26**	0.40**
25.	W-J Passage Comprehension at T3	0.66**	0.54**	0.17*	0.30**	0.18*	0.35**
26.	W-J Calculation at T3	0.52**	0.49**	0.15	0.31**	0.29**	0.34**
27.	W-J Applied Problems at T3	0.54**	0.49**	0.23**	0.29**	0.29**	0.43**
28.	Peabody Picture Vocabulary at T3	0.29**	0.30**	0.13	0.15*	0.17*	0.28**
29.	W-J Letter-Word Identification at T4	0.63**	0.58**	0.15	0.28**	0.22**	0.45**
30.	W-J Passage Comprehension at T4	0.62**	0.58**	0.20**	0.30**	0.23**	0.38**
31.	W-J Calculation at T4	0.52**	0.46**	0.12	0.29**	0.19*	0.31**
32.	W-J Applied Problems at T4	0.49**	0.46**	0.12	0.23**	0.23**	0.45**
33.	Peabody Picture Vocabulary at T4	0.33**	0.37**	0.18*	0.12	0.17*	0.32**

Table 4 (cont'd).

Table 4 (cont'd).

1. P	easure	12)	F 7		2	-
	rogram Exposure						
2. I.	nformant's Education Level						
й Ю	amily Income						
4 . C	hild Temperament						
5. C	hild Academic competence at T2						
9	hild Academic competence at T3						
7. C.	hild Academic competence at T4						
0 0	hild Adjustment to School at T2						
о. О	hild Adjustment to School at T3						
10. C	hild Adjustment to School at T4						
11. C.	hild Social Skills at T2						
12. C.	hild Social Skills at T3						
13. C	hild Social Skills at T4	0.50**					
14. W	-J Letter-Word Identification at T1	0.35**	0.22**				
15. W	-J Passage Comprehension at Tl	0.00	0.02	0.15			
16. W	-J Calculation at T1	0.18*	0.15*	0.16*	0.15*		
17. W	-J Applied Problems at T1	0.19*	0.12	0.39**	0.12	-0.10	

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	Measure	12	13	14	15	16	17
18.	Peabody Picture Vocabulary at T1	0.15	0.19*	0.42**	0.10	0.16*	0.45*
19.	W-J Letter-Word Identification at T2	0.34**	0.24**	0.67**	0.14	0.13	0.47*
20.	W-J Passage Comprehension at T2	0.14	0.04	0.27**	0.09	0.03	0.16*
21.	W-J Calculation at T2	0.11	0.05	0.35**	0.12	0.17*	0.26*
22.	W-J Applied Problems at T2	0.25**	0.21**	0.52**	0.19*	0.13	0.63*
23.	Peabody Picture Vocabulary at T2	0.12	0.16*	0.39**	0.11	0.08	0.44*
24.	W-J Letter-Word Identification at T3	0.48**	0.22**	0.60**	0.04	0.16*	0.43*
25.	W-J Passage Comprehension at T3	**6E.0	0.22**	0.58**	0.06	0.19*	0.45*
26.	W-J Calculation at T3	0.40**	0.32**	0.57**	0.09	0.17*	0.42*
27.	W-J Applied Problems at T3	0.37**	0.27**	0.54**	0.15*	0.23**	0.56*
28.	Peabody Picture Vocabulary at T3	0.10	0.09	0.30**	0.14	0.13	0.41*
29.	W-J Letter-Word Identification at T4	•**0	0.21**	0.57**	0.06	0.12	0.46*
30.	W-J Passage Comprehension at T4	0.33**	0.21**	0.55**	0.13	0.12	0.46*
31.	W-J Calculation at T4	0.32**	0.30**	0.52**	0.15	0.17*	0.47*
32.	W-J Applied Problems at T4	0.36**	0.30**	0.49**	0.15	0.22**	0.52*
33.	Peabody Picture Vocabulary at T4	0.20**	0.18*	0.34**	0.13	0.15	0.36*

	Measure	18	19	20	21	22	23	24
18.	Peabody Picture Vocabulary at Tl							
19.	W-J Letter-Word Identification at T2	0.38**						
20.	W-J Passage Comprehension at T2	0.18*	0.17*					
21.	W-J Calculation at T2	0.30**	0.28**	0.23**				
22.	W-J Applied Problems at T2	0.44**	0.51**	0.23**	0.26**			
23.	Peabody Picture Vocabulary at T2	0.74**	0.37**	0.11	0.24**	0.47**		
24.	W-J Letter-Word Identification at T3	0.38**	0.68**	0.16*	0.26**	0.45**	0.38**	
25.	W-J Passage Comprehension at T3	0.43**	0.59**	0.12	0.29**	0.45**	**6E.0	0.85**
26.	W-J Calculation at T3	0.28**	0.60**	0.14	0.28**	0.52**	0.34**	0.60**
27.	W-J Applied Problems at T3	0.48**	•*65.0	0.20**	0.27**	0.67**	0.41**	0.68**
28.	Peabody Picture Vocabulary at T3	0.72**	0.34**	0.12	0.24**	0.41**	0.78**	0.32**
29.	W-J Letter-Word Identification at T4	0.43**	0.67**	0.14	0.23**	0.46**	0.40**	0.86**
30.	W-J Passage Comprehension at T4	0.45**	0.64**	0.13	0.23**	0.46**	0.44**	0.78**
31.	W-J Calculation at T4	**68.0	0.51**	0.14	0.26**	0.45**	0.33**	0.61**
32.	W-J Applied Problems at T4	0.41**	0.52**	60.0	0.26**	0.62**	0.44**	0.56**
33.	Peabody Picture Vocabulary at T4	0.67**	0.39**	0.04	0.16*	0.38**	0.74**	0.39**

Table 4 (cont'd).
Table 4 (cont'd).

	Measure	25	26	27	28	29	30	31	32
18.	Peabody Picture Vocabulary at Tl								
.61	W-J Letter-Word Identification at T2								
20.	W-J Passage Comprehension at T2								
21.	W-J Calculation at T2								
22.	W-J Applied Problems at T2								
23.	Peabody Picture Vocabulary at T2								
24.	W-J Letter-Word Identification at T3								
25.	W-J Passage Comprehension at T3								
26.	W-J Calculation at T3	0.56**							
27.	W-J Applied Problems at T3	0.64**	0.70**						
28.	Peabody Picture Vocabulary at T3	0.38**	0.26**	0.43**					
29.	W-J Letter-Word Identification at T4	0.80**	0.61**	0.70**	0.39**				
30.	W-J Passage Comprehension at T4	0.76**	0.57**	0.65**	0.43**	**06.0			
31.	W-J Calculation at T4	0.62**	0.63**	0.68**	0.32**	0.68**	0.59**		
32.	W-J Applied Problems at T4	0.54**	0.64**	0.76**	0.46**	0.65**	0.60**	0.64**	
33.	Peabody Picture Vocabulary at T4	0.40**	0.32**	0.44**	0.72**	0.43**	0.47**	0.30**	0.48**

* p < .05 ** p < .01

*** p < .001

Analyses Carried Out to Test the Hypotheses

The following are the main analyses carried out in order to address the research hypotheses of the present study:

1. T-tests for equality of means were conducted in order to assess the impact of child temperament on the various aspects of school functioning that was proposed in hypotheses 1, 2, and 3.

2. Stability analyses were performed on each of the three school functioning variables and each of the five school achievement variables in order to test hypotheses 4, 5, 6, and 7 which stated that school functioning and school achievement will be stable over time, to assess their stability from Time 1 (the initial Fall assessment) to Time 2, from Time 2 to Time 3, and from Time 1 to Time 3.

3. A repeated measures analysis of variance was conducted in order to test hypothesis 8 that compared to difficult temperament, easy temperament is related to higher average gain scores on achievement tests across time.

4. A set of correlational analyses were carried out at each of T2, T3, and T4 to test hypotheses 9, 10, and 11 which stated that school functioning will predict gains in school achievement test scores at each wave. Correlational analysis was also used to test hypothesis 12 that initial ability is directly related to school achievement at T2. 5. Hierarchical regression analyses were used to test hypothesis 13 by assessing the differential strength of temperament, academic competence, school adjustment, and social skills, and initial ability as predictors of gains in school achievement test scores at each wave.

6. Path analysis was used to test the extent to which the proposed longitudinal model of the relationship between all study variables fits the data.

Following is a presentation of the results of these analyses in terms of how they helped confirm or refute the hypotheses proposed in this study.

T-Tests: Effect of Temperament on School Functioning

In order to test hypotheses one, two, and three, three t-tests for the equality of means were performed. The hypotheses stated that there would be a significant difference between the mean scores of children with easy temperament and children with difficult temperament on three aspects of school functioning: academic competence, school adjustment, and social skills. The children who have an easier temperament, in terms of what schools value and prefer, would have higher mean scores on all three academic functioning rating scales.

Three separate t-tests were run rather than a single MANOVA. While, in theory, a MANOVA might have been better because it takes into account the intercorrelations among the school functioning variables (Haase & Ellis, 1987), ttests suited our purposes better. T-tests allow for testing our directional hypotheses regarding the differences between children with easy temperament and those with difficult temperament in mean ratings on each of the school functioning variables; a MANOVA analysis does not.

Table 5 on page 98 summarizes the results of the ttests. As indicated in the table, the value of the t-test for the equality of means of school adjustment and social skills ratings were significant. This suggests that, as we predicted, children with an easy temperament receive significantly higher school adjustment and social skills ratings than children with a difficult temperament.

With regards to academic competence ratings, the tvalue for the equality of means indicates that there is no significant between the two temperament groups in the average competence ratings. It is worth noting, however, that the means differed in the expected direction. In addition, while the t-value for that test was not significant, its p value was .07.

Perhaps artificially dichotomizing the temperament variable has decreased our power to detect a significant difference in the means on academic competence. Inspection of the intercorrelations shown in Table 4 on page 86 revealed that this speculation is true. The correlation

between the continuous temperament variable and Kindergarten academic competence ratings is significant at p < .05.

To conclude, hypothesis one was not supported; compared to children with an easy temperament, children entering school who have a difficult temperament did not receive significantly lower academic competence ratings from their teachers during the Kindergarten year. However, as discussed above, this seems to be solely due to the use of an artificially dichotomized temperament variable. In any case, there is a strong trend in our data towards supporting Hypothesis one, even with the use of the dichotomized temperament variable.

Hypotheses two and three were supported; compared to children with an easy temperament, children entering school who have a difficult temperament do receive significantly lower school adjustment ratings from their parents and lower social skills ratings from their teachers during the Kindergarten year.

Means and Standard Deviations of School Functioning Variables for Different Types of

Temperament

		Child Te	mperament		
	ЕЭ	sγ	Diffi	cult	
	= u)	96)	= <u>u</u>)	19)	<u>t</u> -Value
School Functioning Variables	ΣI	SD	ΣI	SD	(df = 173)
Academic Competence	3.26	1.19	2.95	66 .	1.85
School Adjustment	8.68	1.05	8.20	1.24	2.78**
Social Skills	1.37	.41	1.24	.41	2.06*

* <u>p</u> < .05

** <u>P</u> < .01

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Path Analysis: Stability of School Outcomes

In order to test hypotheses four, five, six, and seven, a least squares path analysis program (PATH) (Hunter, 1992) that allows calculation of stabilities of scales even when their reliabilities are not constant over time was used. The PATH program corrects the test-retest correlations for attenuation due to the imperfect reliabilities of the scales and thus improves the accuracy of the reported results.

The generic model underlying the stability analysis of all scales is presented below in Figure 7 on page 102 where L_t represents the true (latent) score at time t, X_t represents the fallible score at time t, α_t represents the reliability of the measure at time t, the square root of α_t represents the correlation between the true score and the fallible score, and e_t represents the error measurement at time t.

The stability coefficients are the correlations between latent scores over time. More specifically, in this study S_A represents stability from T2 to T3, and S_B represents stability from T3 to T4. The stability from T2 to T4 (S_c) is the product of S_A and S_B . The reliability of the five achievement tests for the present study is not known and therefore it was set to equal 1.0 in the model. Results of the stability analyses are summarized below in Table 6 on page 103 and Table 7 on page 104. As the Chi square (x^2) statistic and its tail probability indicate, the stability model fit the data reasonably well for all the variables except the Peabody Picture Vocabulary Test. A high rating on any of the school functioning measures and a high score on any of the achievement test, except the Peabody test, seems to be highly correlated with high scores on that measure or test at the following school year; the reverse is also true in case of initial low ratings or scores.

Moreover, School functioning variables and academic achievement variables, except the Peabody test score, seem to be even more stable between first grade and second grade than between Kindergarten and first grade. It seems that students' trajectories for success or failure at school become more established after the Kindergarten year. For the Peabody test, a possible reason that the model did not fit the data inspite of the high intercorrelations between the Peabody scores over the years is the existence of correlated errors. There might be a common variable, not accounted for in the model, that needs to be pulled out.

The Woodcock Johnson passage comprehension and calculation test scores are noticeably unstable between Kindergarten and first grade. This was expected because the distributions of these two particular achievement tests were

positively skewed at the Kindergarten year but were more or less normally distributed at the subsequent grade levels. Most Kindergarten students received a zero on these tests and therefore there was very little variability in the scores. First grade scores on the comprehension and calculation tests, on the other hand, differentiate well between students. Thus it is not surprising that scores on these two tests show very low stability between T2 and T3 but high stability between T3 and T4.

To sum up, results of the path analysis support hypotheses 4, 5, and 6 that school functioning ratings are stable from Kindergarten to second grade. With regards to hypothesis 7, the results of the stability analyses seem to offer it overall, but not complete, support. Four out of the five achievement tests were stable across the school years.



Figure 7. Generic Model Underlying All Stability Analyses

Stability of School Functioning Ratings From Kindergarten to Second Grade

	S S	tabili	ty	Re	liabil	ity		
								Tail
School Functioning Variables	SA	SB	Sc	α_2	α_3	α_4	x ²	Probability
Academic Competence	.60	. 65	.39	.96	. 95	.94	60 .	66.
School Adjustment	.34	.43	.15	.75	.86	.86	2.17	.14
Social Skills	.45	.50	.23	.96	.96	.95	.18	.67

Stability of School Achievement Scores From Kindergarten to Second Grade

		Stability			
School Achievement Variables	SA	SB	Sc	x ²	Tail Probability
WJ: Letter-Word Identification	• 68	.86	• 58	1.46	.23
WJ: Passage Comprehension	.12	.76	60.	.13	.72
WJ: Calculation	• 28	. 63	.18	. 65	.42
WJ: Applied Problems	.67	.76	.51	1.95	.16
Peabody Picture Vocabulary	.78	.72	.56	5.91	.02

Repeated Measures ANOVA: Longitudinal Impact of Temperament on School Achievement

In order to test hypothesis 8 that easy temperament would be associated with higher gain scores on achievement tests than difficult temperament, five repeated measures analyses of variance were conducted, one for each of the five tests of achievement used in this study.

A single repeated measures analysis of variance was performed for each test rather than three separate paired ttests of the differences in scores at the three times because the three t-tests would not have been statistically independent and thus some differences would have emerged as significant when they actually are not.

Results of the repeated measures analyses of variance are presented in Table 8 through Table 12 on pages 108 through 112. As the tables indicate, while time has a significant effect on gains in all five achievement test scores, the time by temperament interaction is also significant for all tests of achievement, except the Woodcock Johnson Letter-Word Identification test.

The significant time effect means that, overall, gains in achievement test scores from one year to the next increase in magnitude. The significant time by temperament interaction indicates that when gain scores are averaged across time, children rated by their parents as having an

easy temperament will have higher average gain scores than children rated as having a difficult temperament. Overall, hypothesis eight seems to be supported by the results of the repeated measures analyses of variance. The type of temperament a child has had a significant impact on the average gain scores from Kindergarten through second grade for four out of the five achievement tests.

Given that temperament is significantly related to achievement test scores, the next question that this study seeks to answer is: What are the possible mechanisms underlying this relationship?

This study proposed that temperament is related to achievement through its impact on three important aspects of school functioning: academic competence, school adjustment, and social skills. Earlier t-tests have already confirmed our hypotheses regarding the relationship between temperament and some of these school functioning variables in the Kindergarten year.

Furthermore, stability analyses presented above indicated that ratings on the school functioning measures are stable over time. In other words, high academic competence early in the academic career sets the student up for continued high academic performance. On the other hand, poor academic competence at the time of transition to school places the child on a trajectory for poor academic

competence later on. The same is also true for high early school adjustment and social skills.

The following set of analyses will attempt to . investigate the next set of links in the chain-the relationship between the three aspects of school functioning and academic achievement.

Temperament Group Average Gain Scores for the Woodcock Johnson: Letter-Word

Identification Test at Three Grades

	Asse	ssment (Grade	Statistical	. Significar	nce (F-Tests)	
Temperament Group	Ж	1st	2 nd	Temperament	Time	Temperament X Time	
Easy Temperament	3.10	8.63	7.01				
				2.56	93.98***	1.46	
Difficult Temperament	2.85	7.39	7.04				

* p < .05

** p < .01

*** p < .001

Temperament Group Aver	age Gair	n Scores	s for the	Moodcock Joh	nson: Passage	Comprehension
Test at Three Grades						
	Asse	ssment (Grade	Statistica	l Significance	(F-Tests)
Temperament Group	М	1 st	2 nd	Temperament	Time	Temperament X Time
Easy Temperament	10	6.72	5.99	+ 		* • •
Difficult Temperament	01	4.94	5.31		O - O - T	2 • 7 • 7

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

Temperament Group Avera	ige Gair	n Scores	for th	e Woodcock John	son: Calcul	ation Test at
Three Grades						
	Asse	ssment (srade	Statistical	Significance	e (F-Tests)
Temperament Group	К	1 st	2 nd	Temperament	Time	Temperament X Time
Easy Temperament	.17	6.32	4.14			
Difficult Temperament	.34	4.86	4.79	8 9 9	***14.961	6.25**

* p < .05 ** p < .01

*** p < .001

Temperament Group Average Gain Scores for the Woodcock Johnson: Applied Problems Test

at Three Grades

	Asse	ssment (Grade	Statistical	Significance	e (F-Tests)
Temperament Group	×	1 st	2 nd	Temperament	Time	Temperament X Time
Easy Temperament	1.88	7.7	3.68	ç		++)/r ~
				• 01	TUU. 23***	4 • T Q ×
Difficult Temperament	2.39	6.56	4.32			

* p < .05 ** p < .01

*** p < .001

Temperament Group Aver	age Gain	I Scores	for the	Peabody Pictu	re Vocabulary	Test at Three
Grades						
	Asses	ssment G	rade	Statistical	Significance	(F-Tests)
Temperament Group	Х	1st	2 nd	Temperament	Time	Temperament X Time
Easy Temperament	14.0	12.8	9.61			
				.41	8.31***	3.11*
Difficult Temperament	10.7	15.5	9.10			

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

Correlational Analyses: The Relationship Between School Functioning and School Achievement

Hypotheses 9, 10, and 11 stated that academic competence, school adjustment, and social skills will predict gains in school achievement test scores at each grade level. In order to test these hypotheses a set of correlational analyses were conducted.

Because the school functioning measures are not perfectly reliable, the correlations between them and gains in school achievement test scores are attenuated. Program CORRECT (Hunter & Levine, 1993; Hunter & Schmidt, 1993) was used in order to correct for the attenuated correlations (r_A) due to the imperfect reliability of the school functioning measures. Depending on the reliability of the school functioning measure, the corrected correlations (r_c) were either higher than or equal to the attenuated ones.

In order to decide whether or not to support the prediction that the population correlation is positive (ρ > 0), one-tailed 90% confidence intervals were used. Confidence intervals were used rather than statistical significance tests because the significance test tends to have a higher error rate when the population correlation is not zero (Hunter & Levine, 1993). Program CONFINT (Hunter, 1994b) was used in this study to produce confidence intervals for each correlation.

The inference probability (PI) and the odds ratio were also calculated for each correlation. The inference probability is the probability that the population correlation is greater than zero, i.e. $\rho > 0$. The odds ratio is equal to PI/(1-PI). The PI and odds ratio provide additional information when a directional hypothesis is used (Hunter, 1994a), as is the case for the correlational analyses carried out to test hypotheses 9, 10, and 11.

To give an example: if PI = .93, then (1-PI) = .07 and the odds of $\rho > 0$ are equal to 13:1. To bet on a positive population correlation is a good bet, the error rate for that bet is only 7%. In this study, we concluded that our prediction that $\rho > 0$ is confirmed for cases where PI fell between .66 and 1.0. For correlations with PI less than or equal to .33, we concluded that our prediction was wrong. We suspended judgment on whether the prediction was confirmed or not for correlations with a PI value in the .34 to .65 range.

In addition, the power associated with each result was calculated in order to assess the probability we have, given the sample size and reliabilities of the measures used in this study, of correctly rejecting the null hypothesis and, consequently, supporting the prediction that $\rho > 0$. Since increasing the sample size is one well-known way of

increasing power, the sample size needed so that the onetailed test has a 5% error rate was also calculated using Program CORRECT.

Table 13 through Table 21 on pages 119 through 127 show the results of these correlational analyses. As the tables indicate, at all three grades assessed, higher ratings on each of the school functioning measures are related to higher average gain scores on at least one of the school achievement tests. Overall, out of the 45 predictions that we proposed, 28 were supported, 8 had judgment suspended on them because they had a borderline PI value, and only 9 were rejected.

Looking at the relationship between each school functioning measure and academic achievement across grades revealed some interesting patterns of correlations. Teachers' ratings of both academic competence and social skills seem to be the strongest predictors of school achievement across the years. For each of these two ratings, 10 or more predictions out of our 15 predictions regarding the relationship between the measure and school achievement were supported.

Parents' ratings of child's adjustment to school, on the other hand, does not seem to be as strong a predictor of gains in school achievement test scores. Only 7 of our 15 predictions regarding its relationship to school achievement

over the years were supported, 3 were not supported and 5 had judgment suspended on them.

Looking at each grade level separately, it appears that teachers' ratings of child's academic competence are the strongest predictor of Kindergarten gains in achievement test scores. It is correlated with more achievement tests than the other two school functioning measures. In first grade, all three measures of school functioning correlate highly with gain scores on all four Woodcock Johnson tests. In second grade, teacher's ratings of child's social skills correlate highly with gains in scores on all five achievement tests. Teachers' ratings of child's academic competence at the second grade are also highly related to academic achievement. They correlate positively with gain scores on four out of the five achievement tests.

Parents' ratings of child's adjustment to school, on the other hand, seem to be the least related to school achievement at second grade. They correlate highly with only one achievement test (the Woodcock Johnson Passage Comprehension test) and they are even negatively correlated with two achievement tests: the Woodcock Johnson calculation and applied problems tests.

To summarize, while hypotheses 9, 10, and 11 were not completely supported, the results of the correlational analyses clearly offer overall support to all three

hypotheses. As discussed above, 28 out of the total 45 predictions related to these three hypotheses were supported and 8 predictions had judgment suspended on them because their PI's were borderline (as close as .65 for several of them).

Hypothesis twelve was tested next. It stated that initial cognitive ability, as measured by scores on the tests of achievement at T1 (i.e. at the first few weeks of the school experience, before any substantive schooling had been received), will be significantly related to scores on school achievement tests given at T2, i.e. at the end of the Kindergarten year. In order to test this hypothesis correlational analyses similar to the ones described above were carried out. However, because the reliability of the school achievement measures is not available for this study, it was not possible to correct these correlations for attenuation.

The results of these correlational analyses are summarized in Table 22 on page 128. As the results indicate, hypothesis twelve was supported for all five tests. Initial ability, as indexed by scores on each of the Woodcock Johnson tests and the Peabody Picture Vocabulary Test, is highly correlated with school achievement. The higher the initial test scores at T1 the higher the test scores at T2.

Given that temperament affects school through its relationship to the various aspects of school functioning, and given that initial ability also affects school achievement, the next question proposed by this study is: Does temperament make any significant contribution to the prediction of school achievement over and above what initial ability predicts? The answer to this question was sought through the next set of analyses.

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T2 Correlations of Academic Competence with School Achievement

			806					Sample	
			Confidence		odds	Prediction		Size	
Achievement Test	ra	rc	Interval	ΡΙ	Ratio	Supported?	Power	Needed	
WJ:Letter-Word Identification	11	11	23≤ p ≤.01	.07	.1:1	NO	80	868	
WJ:Passage Comprehension	.07	.07	05≤p≤.19	.82	5:1	Yes	248	2175	
WJ:Calculation	.01	.01	11≤p≤.13	. 55	1:1	JS	78	107563	
WJ:Applied Problems	.05	.05	07≤p≤.17	.75	3:1	Yes	16%	4282	
Peabody Picture Vocabulary	.05	.05	07≤p≤.17	.75	3:1	Yes	168	4282	

JS= Judgment Suspended (PI falls between .34 and .65)

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			90% Confidence		Odds	Prediction		Sample Size
Achievement Test	ra	ц	Interval	ΓI	Ratio	Supported?	Power	Needed
WJ:Letter-Word Identification	.12	.14	0≤ p ≤.24	.95	17:1	Yes	498	726
WJ:Passage Comprehension	.05	•06	07≤ p ≤.17	.75	3:1	Yes	168	4282
WJ:Calculation	.01	.01	11≤p≤.13	• 55	1:1	JS	78	107563
WJ:Applied Problems	.02	.02	10≤ p ≤.14	.60	2:1	JS	8 8	26875
Peabody Picture Vocabulary	07	08	19≤ p ≤.05	.18	.2:1	NO	1 8	2175
JS= Judgment Suspended (PI fal	ls bet	ween	.34 and .65)					

			908					Sample
Achievement Test	ra	rc	Interval	ΡΙ	Ratio	Supported?	Power	Needed
WJ:Letter-Word Identification	09	- 00	21≤ p ≤.03	.12	.1.1	NO	80	1307
WJ:Passage Comprehension	.11	.11	01≤ p ≤.23	.93	13:1	Yes	438	868
WJ:Calculation	05	05	17≤ p ≤.07	.25	.3:1	NO	18	4282
WJ:Applied Problems	.02	.02	10≤p≤.14	.60	2:1	JS	86 86	26875
Peabody Picture Vocabulary	• 03	• 03	09≤ p ≤.15	. 65	2:1	JS	118	11933
JS= Judgment Suspended (PI fal	ls bet	ween	.34 and .65)					

T2 Correlations of Social Skills with School Achievement

Table 15

T3 Correlations of Academic Competence with School Achievement

			90% Confidence					Sample
Achievement Test	۲A	rc	Interval	Id	Ratio	Supported?	Power	Needed
				,			0 0 7	
WU:LETTET-WORD IDENTIFICATION	•48	• t J	8C.≤q≤85.	О• т	499.1	Yes	800T	87
WJ:Passage Comprehension	.64	.66	.57≤ p ≤.71	1.0	999:1	Yes	100%	10
WJ:Calculation	.44	.45	.34≤ p ≤.54	1.0	999:1	Yes	100%	37
WJ:Applied Problems	.11	.11	01≤ p ≤.23	69	13:1	Yes	438	868
Peabody Picture Vocabulary	04	04	 16≤ p ≤.08	• 30	.4:1	NO	2 %	6703

JS= Judgment Suspended (PI falls between .34 and .65)

T3 Correlations of School Adjustment with School Achievement

			806					Sample	
			Confidence		Odds	Prediction		Size	
Achievement Test	r_{A}	rc	Interval	Id	Ratio	Supported?	Power	Needed	
WJ:Letter-Word Identification	.24	• 26	.12≤ p ≤.36	1.0	999:1	Yes	968	166	
WJ:Passage Comprehension	.24	.26	.12≤ p ≤.36	1.0	999:1	Yes	928	200	123
WJ:Calculation	.28	• 30	.17≤ p ≤.39	1.0	999:1	Yes	866	117	
WJ:Applied Problems	• 07	• 08	05≤p≤.19	. 82	5.1	Yes	248	2175	
Peabody Picture Vocabulary	.01	.01	11≤p≤.13	.55	1:1	JS	78	107563	

JS= Judgment Suspended (PI falls between .34 and .65)

T3 Correlations of Social Skills with School Achievement

			806					Sample
			Confidence		odds	Prediction		Size
Achievement Test	r_{A}	rc	Interval	Γ	Ratio	Supported?	Power	Needed
WJ:Letter-Word Identification	.40	.41	.30≤ p ≤.50	1.0	999:1	Yes	100%	58
WJ:Passage Comprehension	.35	.36	.24≤ p ≤.46	1.0	999:1	Yes	1008	68
WJ:Calculation	.37	.38	.26≤ p ≤.48	1.0	999:1	Yes	1008	5
WJ:Applied Problems	.14	.14	.02≤p≤.26	. 97	33:1	Yes	60%	528
Peabody Picture Vocabulary	04	04	16≤ p ≤.08	.30	.4:1	NO	28	6703

JS= Judgment Suspended (PI falls between .34 and .65)

Achievement Test	ra	rc	90% Confidence Interval	Id	Odds Ratio	Prediction Supported?	Power	Sample Size Needed
WJ:Letter-Word Identification	.25	.26	.13≤ p ≤.37	1.0	999:1	Yes	878	152
WJ:Passage Comprehension	.25	.26	.13≤ p ≤.37	1.0	999:1	Yes	978	152
WJ:Calculation	.11	.11	01≤ p ≤.23	. 93	13:1	Yes	438	868
WJ:Applied Problems	- 06	06	18≤ p ≤.06	.21	.3.1	NO	18	2967
Peabody Picture Vocabulary	.13	.13	.01≤ p ≤.25	.96	24:1	Yes	548	616

T4 Correlations of Academic Competence with School Achievement

Table 19

JS= Judgment Suspended (PI falls between .34 and .65)

			806					Sample
Achievement Test	ra	rc	Confidence Interval	Id	Odds Ratio	Prediction Supported?	Power	Size Needed
WJ:Letter-Word Identification	.03	.03	09≤ p ≤.15	. 65	2:1	JS	118	11933
WJ:Passage Comprehension	.14	.15	.02≤ p ≤.26	.97	33:1	Yes	608	528
WJ:Calculation	04	04	16≤ p ≤.08	.30	.4:1	NO	28	6703
WJ:Applied Problems	09	- 1	21≤ p ≤.03	.12	.13:1	NO	08	1307
Peabody Picture Vocabulary	.02	.02	1≤p≤.14	.60	2:1	JS	86 26	26875
JS= Judgment Suspended (PI fal	ls bet	ween	.34 and .65)					

T4 Correlations of School Adjustment with School Achievement

Table 20

T4 Correlations of Social Skills with School Achievement

Achievement Test	ra	rc	90% Confidence Interval	Id	Odds Ratio	Prediction Supported?	Power	Sample Size Needed	
WJ:Letter-Word Identification	.07	.07	05≤ p ≤.19	.82	5:1	Yes	248	2175	
WJ:Passage Comprehension	.06	.06	06≤ p ≤.18	67.	4:1	Yes	208	2967	127
WJ:Calculation	.07	.07	05≤ p ≤.19	.82	5:1	Yes	248	2175	
WJ:Applied Problems	.04	.04	08≤ p ≤.16	.70	2:1	Yes	138	6703	
Peabody Picture Vocabulary	.14	.14	.02≤ p ≤.26	.97	33:1	Yes	60%	528	

JS= Judgment Suspended (PI falls between .34 and .65)

Correlations Between Initial Ab	ility a	nd School Achi	evemer	lt in K	indergarten		
Test for which Relationship		806					Sample
3etween T1 & T2 Scores was		Confidence		odds	Prediction		Size
Assessed	ra	Interval	ΓI	Ratio	Supported?	Power	Needed
WJ:Letter-Word Identification	.67	.60≤ p ≤.74	1.0	999:1	Yes	1008	8
WJ:Passage Comprehension	60.	03≤ p ≤.21	• 88	8:1	Yes	33&	1307
NJ:Calculation	.17	.05≤ p ≤.29	66.	95:1	Yes	758	352
WJ:Applied Problems	. 63	.56≤ p ≤.70	1.0	999:1	Yes	100%	10
Peabody Picture Vocabulary	.74	.68≤ p ≤.80	1.0	999:1	Yes	100%	5
Regression Analyses: Differential Prediction of School Achievement

Hierarchical regression analyses were carried out in order to test hypothesis thirteen, which stated that temperament, academic competence ratings, school adjustment ratings, and social skill ratings will add to the prediction of gains in achievement test scores at each wave over and above the contribution of initial cognitive ability.

Because there are five different dependent variables at each wave of data, it would have been necessary to run fifteen different hierarchical regression analyses: 5 for T2 data, 5 for T3 data, and 5 for T4 data. In order to reduce the number of analyses needed and increase the ease and clarity of interpretation of the results, a variable representing overall gain in school achievement test scores was created at each wave of data. At each grade, the gain scores on all five achievement tests were summed together and then averaged. Thus, at each grade the respective average gain score for each child was used in the regression analysis as an index of the child's overall gain in scores on school achievement tests.

Before conducting the regression analyses, the intercorrelations among the initial achievement test scores were inspected. As Table 4 on page 86 shows, these initial test scores at T1 are highly intercorrelated. In order to

avoid problems associated with correlated predictors, and in order to reduce the number of predictors in the regression equation, the test scores at T1 were summed and averaged into a single variable indexing initial ability.

Three regression analyses were performed: one for T2, one for T3, and one for T4. The average of the initial scores on the Woodcock Johnson and Peabody tests was entered first into the model in order to control for the effects of initial cognitive ability in examining the contribution of the remaining predictors. Temperament, academic competence, school adjustment, and social skills were entered together in the second step. The dependent variable in all the regression analyses was the overall gain score at the respective grade.

Results of the regression analyses are presented in Table 23 through Table 25 on pages 133 through 135. As the tables show, initial cognitive abilities are significant predictors of change scores on school achievement tests at every grade level.

At the same time, the other predictors were clearly important as well. At T3 and T4, temperament and the three school functioning variables accounted for a significant amount of variance in gain scores, after controlling for initial abilities. This finding was not true for T2 data,

however. Therefore, hypothesis thirteen was supported for T3 and T4 data but not for T2 data.

The regression results also indicate that the teachers' ratings of child's academic competence were the strongest step 2 predictor of gains in academic achievement test scores at all waves. Moreover, the beta weights of these academic competence ratings are larger than those for initial ability at all time points. This indicates that the teachers' ratings of academic competence explain a larger portion of the variance in gain scores than initial ability.

Based on the results of the above regression analyses, an additional exploratory set of regression analyses was carried out post-hoc. The purpose of these analyses was to explore whether aspects of school functioning other than academic competence would add significantly to the prediction of academic achievement after factoring out the effects of initial ability and of academic competence on gains in school achievement test scores.

Results of these exploratory regression analyses are presented below in Table 26 through Table 28 on pages 136 through 138. The results clearly confirm the pattern that seemed to emerge from the earlier regression analyses. Initial ability contributes significantly to the prediction of gains in academic achievement test scores. Teachers' ratings of students' academic competence skills adds

significantly to the prediction of gain scores at each grade level after taking into the account the effect of initial ability. The other two aspects of school functioning-school adjustment and social skills-do not significantly add to the prediction of gains in achievement scores once the effects of initial ability and academic competence are taken into account.

As a final analysis, the overall longitudinal model proposed in this study of the direct and indirect effects of temperament on child school functioning and school achievement test scores was examined. This model presents an overall conception of the impact of temperament on school functioning as well as the impact of school functioning on school achievement test scores over the school years. Results of this final analysis are discussed in the next section.

Initial Ability, Temperament, and School Functioning Variables Predicting Average

Gains in Academic Achievement Test Scores at T2

	Ste	de
Predictor Variables	1	2
Initial Cognitive Ability	15*	
Temperament		.10
Academic Competence		.27*
School Adjustment		04
Social Skills		08
	$\Delta R^{2}_{(1, 173)} = .02*$	$\Delta R^{2}_{(4, 169)} = .04$
	Final R ²	= .06*

*p < .05; **p < .01; ***p < .001

Initial Ability, Temperament, and School Functioning Variables Predicting Average

Gains in Academic Achievement Test Scores at T3

	Ste	ep
Predictor Variables	1	2
Initial Cognitive Ability	.23**	
Temperament		.05
Academic Competence		.37***
School Adjustment		00
Social Skills		60.
I	$\Delta R^{2}_{(1, 173)} = .05**$	$\Delta R^{2}_{(4, 169)} = .15 * * *$
	Final R ²	= .21***

*p < .05; **p < .01; ***p < .001

Initial Ability, Temperament, and School Functioning Variables Predicting Average

Gains in Academic Achievement Test Scores at T4

	Ste	da
Predictor Variables	1	2
Initial Cognitive Ability	.17*	
Temperament		.07
Academic Competence		.21*
School Adjustment		08
Social Skills		. 05
	$\Delta R^{2}_{(1, 173)} = .05**$	$\Delta R^{2}_{(4, 169)} = .05*$
	Final R ²	= .08**

*p < .05; **p < .01; ***p < .001

Initial Ability, Academic Competence, and Other School Functioning Variables

Predicting Average Gains in Academic Achievement Test Scores at T2

		Step	
Predictor Variables	1	5	m
Initial Cognitive Ability	15*		
Academic Competence		.21*	
School Adjustment			03
Social Skills			06
	$\Delta R^{2}_{(1, 173)} = .02*$	$\Delta R^{2}_{(1, 172)} = .03*$	$\Delta R^{2}_{(2, 170)} = .00$
		Final R ² = .05*	
*p < .05			

***p < .001

*p < .01

Initial Ability, Academic Competence, and Other School Functioning Variables

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		Step	
Predictor Variables	1	2	3
Initial Cognitive Ability	.23**		
Academic Competence		. 44***	
School Adjustment			00.
Social Skills			60.
	$\Delta R^{2}_{(1, 173)} = .05 * *$	$\Delta R^{2}_{(1, 172)} = .15 * * *$	$\Delta R^{2}_{(2, 170)} = .01$
		Final R ² = .20***	
*p < .05			

***p < .001

*p < .01

Initial Ability, Academic Co	mpetence, and Other	School Functioning V	ariables
Predicting Average Gains in	Academic Achievement	: Test Scores at T4	
		Step	
Predictor Variables	1	2	3
Initial Cognitive Ability	.17*		
Academic Competence		.23**	
School Adjustment			04
Social Skills			. 04
	$\Delta R^{2}_{(1, 173)} = .03*$	$\Delta R^{2}_{(1, 172)} = .04 * *$	$\Delta R^{2}_{(2, 170)} = .01$
		Final $R^2 = .08 * *$	
*n < .05			

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

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Path Analysis: Mechanisms Underlying the Relationship
between Temperament and School Achievement
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The present study proposed an overall longitudinal model of the relationship between temperament and school achievement from Kindergarten to second grade. The model, shown in Figure 2 on page 52, proposed that the relationship between temperament and school achievement would be mediated by academic competence, adjustment to school, and social skills. This model was tested using Path analysis.

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LISREL 8 (Joreskog & Sorbom, 1993) was used to analyze the covariance matrix of all the variables in the model and to obtain standardized path coefficients as well as fit indices of the degree to which the model fits the data analyzed in this study. LISREL was chosen because it takes into consideration the imperfect reliability of the scales and corrects for the resulting attenuation of the correlations (Joreskog & Sorbom, 1993).

The results are summarized in Figure 8 on page 146. Note that changes in raw scores on achievement tests are used in the model rather than raw scores per se. As can be seen from the fit indices, the proposed model did not fit the data well. Moreover, the t-values for the paths from school adjustment and social skills to gains in achievement test scores were not significant at any of the three waves. The path from temperament to teachers' ratings of child's academic competence did not have a significant t-value either.

Initial ability was negatively correlated with gains in achievement test scores at Kindergarten. Gains from one grade to the next were also negatively correlated with one another. This indicates that children who start school with high initial ability show less gains in achievement test scores at Kindergarten than children who enter Kindergarten with lower initial abilities. Similar relationships exist between gain scores at any grade and gain scores at the next grade.

Because the repeated measures analyses of variance indicated that child temperament is related to school achievement, an alternative model was tested. The alternative model included, in addition to all the paths in the proposed model, direct paths from temperament to gains in school achievement test scores at each grade level. The direct paths from temperament to gains in school achievement test scores at the Kindergarten, first grade, and second grade were all non significant. Furthermore, the overall model did not fit the data well. The chi-square statistic for the alternative model was significant at p=0.0 and was equal to 523.8 with 66 degrees of freedom. The RMSEA statistic was equal to .20, the AGFI was equal to .54, and the NNFI was equal to .27.

The fact that the alternative model did not fit the data well, and in fact had a worse fit than the proposed model, and the fact that none of the direct paths from temperament to gain scores were significant, offer support for this study's argument that temperament exerts its impact on school achievement indirectly through its effect on the various aspects of school functioning that exist within the school context. Clearly, as proposed in the present study, there are mediating mechanisms underlying the connection between temperament and school achievement.

As an exploratory analysis, a revised model was constructed after examining the t-values and modification indices for the proposed model. Modification indices for the original model suggested that paths exist from social skill ratings to academic competence ratings and school adjustment ratings. The t-values for the original model suggested that only academic competence ratings are directly related to gains in academic achievement test scores. The t-values also suggested removal of the path from temperament to Kindergarten academic competence ratings.

After carrying out these revisions, a modified model, shown in Figure 9 on page 147 was obtained. The chi-square statistic for the modified model was still significant, indicating a poor fit between the model and the data. However, chi-square tends to be large in relatively large

sampl the p nodel squa all moji les tea ch. ra 301 ĝa : . Fa Ç S â i 9 +... 2 samples (Joreskog & Sorbom, 1993) such as the sample used in the present study. The other fit indices for the modified model-which are not as dependent on sample size as the chisquare is-indicated that it fit the data well. In addition, all the paths in the modified model are significant and the modification indices for the model are very small.

Based upon this model, gains in academic achievement test scores were only predicted by initial ability and teachers' ratings of child's academic competence. The child's temperament was directly related to social skills ratings and school adjustment ratings but not to academic competence ratings.

Social Skills ratings were only indirectly related to gains in academic achievement test scores, through the impact of social skills on academic competence ratings. Parents' ratings of the child's school adjustment were predicted by the child's temperament and the teachers' social skills ratings. However, the child's school adjustment, as rated by the parent, was neither directly nor indirectly related to gains in academic achievement test scores.

While the proposed model did not fit the data well, the modified model, which does seem to fit the data, has many elements in common with the proposed model. As proposed in this study (hypotheses 2 and 3), temperament was related

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to school adjustment and social skills ratings. Moreover, confirming hypotheses 4, 5, 6, and 7, academic functioning measures and school achievement gains were stable from Kindergarten to second grade.

Hypothesis 9 was also confirmed; academic competence ratings at each of the grades examined in this study were related to gains in academic achievement test scores. Hypothesis 11 was indirectly confirmed; social skill ratings were indirectly related to gains in school achievement test scores through their relationship to academic competence ratings. Hypothesis 8 was, in effect, partially confirmed; in the modified model, temperament was related to gains in achievement test scores through its effect on social skills ratings. Finally, the relationship between initial ability and Kindergarten gains in achievement test scores that was proposed under hypothesis 12 was also significant in the modified model.

Therefore, overall, the results of the Path analysis partially supported the model proposed in this study of the mechanisms underlying the predictive relationship of temperament to school achievement. While our proposed model did not fit the data well, it came close to describing at least some of the mechanisms underlying the relationship between child temperament and school achievement.

The Path analysis results are, as would be expected, in agreement with the results of the previous analyses carried out in this study to test separate parts of the model. To specify, t-test results indicated that temperament is significantly related to school adjustment and social skills ratings but not to academic competence ratings. The modified model tells the same story.

In addition, stability analyses showed, just as indicated in the modified model, that school achievement, academic competence, school adjustment, and social skills are stable over time.

Finally, correlational and hierarchical regression analyses revealed that teachers' ratings of child academic competence are the strongest predictors of school achievement, parents' ratings of child's adjustment to school are the weakest predictors.

Correlational and regression analyses also indicated that initial ability was related to Kindergarten achievement test scores. These same relationships were represented by significant paths in the modified model.

What the modified path model seems to tell us that was not clear from the other separate analyses is that there is a significant relationship between teachers' ratings of children's social skills and their ratings of the children's academic competence. There also appears to be a relationship

between teachers' ratings of children's social skills and parents' ratings of the children's adjustment to school.







Predicting Later Achievement Gains

Discussion

This study examined the mechanisms underlying the longitudinal relationship between child temperament and child school achievement for a sample of African American children from predominantly low income families. The results provide evidence for the effect of temperament on aspects of school functioning, which, in turn, impact school achievement.

Many of the proposed hypotheses were supported by the data obtained from our sample, some were not supported, and some additional findings not proposed by this study emerged from the analyses. In the next section, the findings of the present study will be discussed. The implications of these findings will then be considered. Finally, the limitations of the present study along with recommendations for further research will be discussed.

Study Findings

Hypothesis 1: Temperament and Academic Competence

Our hypothesis that difficult child temperament would be associated with lower teacher ratings of the child's academic competence was not supported by our data. This finding was surprising because other researchers (Entwisle et al., 1988; Gordon & Thomas, 1967; Pallas et al., 1987; Talwar, 1989) have found that children who are highly sociable, attentive, and soothable and not highly emotional

or active receive positive reactions and higher academic competence ratings from their teachers. It is also surprising because it made sense to expect that easy temperament characteristics would facilitate the acquisition of higher academic competencies by increasing the child's ability to profit from instruction.

It is a welcome surprise, though, because it suggests that teachers are objective in their ratings of children and are able to distinguish between the child's behavioral style that might not be optimal for school functioning on the one hand and the actual academic competencies of the child on the other. However, as will be discussed later, teachers' ratings of academic competence may be indirectly affected by the child's temperament through its relationship with child social skills.

Hypothesis 2: Temperament and School Adjustment

Our prediction that, compared to children with difficult temperament, children with easy temperament would show higher levels of adjustment to school was supported by our data. These results are in line with previous research findings (Jewsuwan, Luster & Kostelnik, 1993; Klein, 1980; Klein, 1982a; Scholom, Zucker & Stollak, 1979; Thomas & Chess, 1977).

It is worth noting that most previous researchers have found this relationship to hold using teachers' ratings of

school adjustment. The present study, thus, extends the findings of previous research to cases where the child's adjustment to school is rated by the parent rather than the teacher. The generalizability of this finding across sources of report offers evidence for the strength of the link between child temperament characteristics and child school adjustment.

This finding needs to be viewed with some caution, though. Because both child temperament ratings and school adjustment ratings were provided by the parent, there is a possibility that the significant relationship found in this study between temperament and school adjustment is partly due to shared method variance. Parents who generally view their children in a highly positive light may tend to perceive their behavioral style as easy and might also tend to perceive their children as well adjusted in school. Hypothesis 3: Temperament and Social Skills

As predicted in this study, child temperament was positively related to social skills. Children with an easy temperament received higher social skills ratings from their teachers than children with a difficult temperament.

Other researchers (Attili, 1990; Barclay, 1987; Hodgins & Koestner, 1993; Spangler, 1990) have reached similar conclusions. As suggested by Klein (1992b), difficult temperament may be associated with a more internal

focus while easy temperament may be related to a more outward-directed focus. An other-oriented attention style may facilitate awareness of social demands and constraints within the school context. This, in turn, would lead to highly developed social kills.

Alternatively, it may be that children with an easy temperament are sought out for play and other social activities more than children with a difficult temperament. They, therefore, would have more opportunities to acquire and develop school-related social skills through peer interactions.

This finding, as well as the finding that temperament is related to school adjustment, while supporting our hypotheses regarding the importance of temperament for school functioning, need to be viewed with reservation. The relationships between temperament and these school functioning variables, while significant, are not very strong. Perhaps if teachers, rather than parents, had provided the ratings of temperament stronger relationships between temperament and school functioning would have emerged. The dimensions of temperament that have been linked to school functioning (for example, task orientation) may be more readily observable in the school setting by the teachers than in the home setting by the caregivers. Hypotheses 4 to 7: Stability of School Functioning and Academic Achievement

Our hypotheses regarding the stability of academic competence, school adjustment, social skills, and school achievement were all supported by the data. While this may be because the temperament characteristics that produced these perceptions and ratings are stable themselves (Carey & McDevitt, 1979), a more plausible explanation is that children are fairly stable in terms of academic and social skills. Different teachers may be simply providing accurate judgments of fairly stable characteristics over the school years.

This could also be due, at least in part, to the fact that children earn "reputations" within the school early on in their academic careers. Teachers' lounge conversations about past and present pupils, no doubt, helps maintain teachers' perceptions about the academic competencies and social skills of the various students (Seaver, 1973).

Clearly, as established by others (Berrueta-Clement et al., 1984; Entwisle & Alexander, 1993; Klein, 1982b; Rutter, 1989), early school experiences are critical. They establish the conditions for later school performance. Early school success is likely to establish a firm ground on which the child can build more school success over the years.

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Hypothesis 8: Temperament and School Achievement

Our data provided support for the proposition that child temperament characteristics would be indirectly related to gains in school achievement test scores. Children who are highly sociable, attentive, and soothable while being low on emotionality and activity showed higher gains in achievement test scores from Kindergarten to first grade than children with difficult temperaments.

This pattern is much less pronounced from first grade to second grade. This is probably because most of the impact of temperament on school achievement becomes absorbed into the system in first grade (Alexander, Entwisle, and Dauber, 1993). Beyond first grade several other variables in the system that might have been earlier affected by temperament would start to "compete" with temperament in impacting school achievement, and thus the effect of temperament on school achievement becomes diluted.

These results are consistent with the findings reported by previous researchers in this area (Klein & Tzuriel, 1986; Martin et al., 1988; Palisin, 1986; Thomas & Chess, 1977). Unlike the majority of previous studies, this study used a sample of African American children. The fact that similar results were obtained testifies to the strength and universality of the relationship between child temperament and school achievement. Yet, previous research did not provide clear explanations of the mechanisms underlying this relationship between child temperament characteristics and school achievement. In the present study, three possible mediators of the relationship between child temperament and school achievement were assessed. It was conceptualized that temperament could affect school achievement through its impact on the child's academic competence, social skills, and school adjustment. Correlational analyses were conducted to assess the relationship between each of these aspects of school functioning and academic achievement. Following is a discussion on the results of these assessments.

Hypothesis 9: Academic Competence Ratings and School

Achievement

Our data supported the prediction that academic competence would be significantly related to school achievement. Regression as well as path analyses indicated that the effect of academic competence on school achievement is even stronger than the effect of initial ability on school achievement. This was true inspite of the fact that we used change scores on achievement tests in the analyses. Change scores are, by definition, correlated from one grade to the next because the change score at each time point contains elements from the previous change score. This interdependence among change scores would result in

artificially increasing the relationship between initial ability and academic achievement. Yet, inspite of this inflated relationship, academic competence still emerged as a stronger predictor of school achievement than initial ability or previous achievement. This indicates that academic competence is quite a strong predictor of school achievement.

These findings are congruent with previous research indicating that teachers' ratings of child academic competence at the end of sixth grade were related to testbased school achievement in both sixth and seventh grade (Talwar, 1989). As discussed above, the literature on the longitudinal relationship between teachers' ratings of academic competence and school achievement is limited. Studies on African American children in particular are limited in this area. The present study thus contributed to the literature in both of these areas.

The finding that teachers' ratings of academic competence consistently predicted gains in achievement test scores in our sample is one of the most important findings in the present study, and thus it warrants further discussion. Teacher's ratings of the child's academic competence may be related to the child's achievement test scores through two different paths. First, in so far as these academic competence ratings are accurate, valid

reflections of actual levels of children's learning, it follows that high academic competence ratings will be highly related to scores on academic achievement tests (Brophy, 1983).

Second, in so far as these teacher ratings of academic competence reflect the positive effect of the child's wellfitting, easy temperamental characteristics on the teacher's perceptions and "liking" of that child, these academic competence ratings can in and of themselves contribute to students' achievement as measured by objective tests (Entwisle & Alexander, 1988).

Research has established that the existence of a teacher expectation for a particular student's performance increases the probability that the student's performance will move in the direction expected (Beez, 1970; Brophy & Good, 1974; Rosenthal & Jacobson, 1968; Rothbart, Dalfen & Barrett, 1971). In other words, positive feedback and reinforcement from the teacher could shape and, in a way, produce learning.

As Brophy (1983) argued in his review of the literature on teacher expectations and the self-fulfilling prophecy, differential teacher perceptions will lead to differential teacher behavior. Children for whom teachers hold high expectations are held to stricter standards, are called upon more, and are more often pressed for answers than students for whom teachers hold low expectations (Entwisle & Alexander, 1988; Rosenthal & Jacobson, 1968).

Low-expectation students, on the other hand, are subjected to more managerial behaviors and are placed at greater distance from the teacher in the classroom (Brophy & Good, 1974; Seaver, 1973). Differential teacher behavior is thus likely to affect the student's self concept and achievement motivation. Ultimately this will make a difference in student's achievement test scores indicating that teacher perceptions and expectations can function as self-fulfilling prophecies.

This effect seems to be especially potent in young students (Mendels & Flanders, 1973; Seaver, 1973), like the children assessed in our study. Young children may be particularly susceptible to teacher expectation effects because when they begin their schooling they are at a stage when their self concepts and their perceptions of themselves as students are still developing.

To the extent that teachers' ratings of academic competence index actual child academic competence as well as teacher perceptions, expectations, and ways of handling the students, then, these ratings are powerful predictors of early and later scores obtained on objective academic achievement tests by children.

Hypothesis 10: School Adjustment Ratings and School Achievement

Correlational analyses indicated that parents' ratings of child school adjustment is related, albeit not consistently over the years, to some aspects of school achievement. However, the results of the hierarchical regression analyses as well as those of the Path analysis revealed that when all three school functioning variables were examined concurrently, school adjustment was neither directly nor indirectly related to school achievement.

These results were not expected, given the wealth of previous research linking child school adjustment to school achievement (Alexander et al., 1993; Callahan & Cowen, 1985; Dauber et al., 1993; Ricard et al., 1995; Teo et al., 1996). These previous studies have documented that school achievement, even through high school, can be predicted from early school adjustment (Teo et al., 1996). In some of the studies cited above (Ricard et al., 1995, for example), school adjustment predicted performance on school achievement tests even after controlling for the effects of the child's IQ.

One possible reason behind our failure to find an overall significant relationship between school adjustment and school achievement in our sample may be that school adjustment ratings were provided by the parents. Perhaps the

parents' perceptions of how adjusted their children are to the school setting are not as accurate as the teachers'. It may not be coincidental that all the studies cited above that found a significant relationship between school adjustment and school achievement have used teachers' ratings, not parent ratings, to assess the child's adjustment to school.

Teachers may be in a better position to make these judgments because they observe the child in the school context for many hours on a daily basis. Moreover, teachers interact with many children from the same age group. Their wealth of experience with many children over the years no doubt enables them to provide more accurate judgments of child adjustment to school.

Parents in our sample were not themselves highly educated compared to other parent groups, even though the majority at least finished high school. This may have influenced their ratings. They might not have had optimal experiences with the school system and thus they may have less well-developed views of what makes good school adjustment.

Another reason for the lack of relationship between parental ratings of child school adjustment and school achievement in our data may be that the parents in our sample were predominantly low-income. The link between poverty and life stressors, especially for minority families, has been well documented in the literature (McLoyd, 1990, for example). Parents in our sample may have been especially unable to provide accurate judgments about their children's school adjustment because of the many stressors and pressures that impact their lives.

It is interesting to note that parents' ratings of school adjustment seemed to predict school achievement best in first grade. Perhaps first grade, being the first year of full-day formal schooling for a child, is a year when parents put special effort into getting involved with their children's schooling and thus become more aware of any adjustment problems that their children may be experiencing.

Alexander, Entwisle, and Dauber (1993) have provided another explanation for the differential power of school adjustment as a predictor of school achievement over the school years. They argued that it often appears that school adjustment is predictive of school achievement in first grade but not in later grades because of the high stability in testing patterns beyond first grade. This stability results in most of the impact of school adjustment on school achievement being "absorbed" into the system in first grade. <u>Hypothesis 11: Social Skills Ratings and School Achievement</u>

The results of the correlational, hierarchical regression, and LISREL analyses taken together seem to

indicate that the relationship between social skills and school achievement can best be characterized as an indirect one. Child's social skills are related to gains in academic achievement test scores indirectly through their impact on child academic competence.

These results, while not what we expected to find, are not necessarily in conflict with the existing literature. Other researchers (Austin & Draper, 1984; Fad & Ryser, 1993; Walker & Hops, 1976; Wentzel, 1991) have reported that social skill deficits are related to poor academic achievement while high social skills are related to high scores on academic achievement tests. In our study, when the relationship between just social skills and academic achievement was examined using correlational analyses, social skills appeared to be related to academic achievement, which is the finding reported by the research cited above.

However, when all study variables were examined simultaneously using hierarchical regression and LISREL analyses, it became clear that the relationship between social skills and academic achievement is only an indirect one. Perhaps if other researchers had included academic competence in their models the same relationships would have emerged.

This finding may be telling of a process that was described more than 30 years ago in a study by Schmuck (1963). In that study, having positive social interactions with peers was found to be related to high utilization of academic abilities. It seems that social skills facilitate peer-group liking, which, in turn, helps the student create a positive image of him/herself within the school context in general. Positive self image, self confidence, and a positive attitude towards school would, in turn, naturally result in higher academic competencies and, ultimately, higher gain scores on academic achievement tests.

Alternatively, it may be that social skills and academic competence are related to each other because the same person, the teacher, is rating the child on both of these measures at the same time. Teachers who view the child positively in terms of academic competence may also view the child positively in terms of social skills and vice versa. <u>Hypothesis 12 and Hypothesis 13: Predictors of School</u>

Achievement

It was hypothesized that, while initial cognitive ability would predict gains in academic achievement test scores, temperament and the school functioning variables impacted by temperament would still add to the prediction of gain scores on academic achievement tests after the effect of initial cognitive ability is accounted for. This
hypothesis was supported only for academic competence ratings. Teachers' ratings of academic competence at each grade level were significantly related to gain scores on achievement tests, even after the effects of initial cognitive ability on academic achievement were taken into account.

This finding is uplifting. It suggests that children with low initial cognitive abilities do not have to be "doomed" to an unsuccessful school career. If these children can acquire certain academic competencies such as motivation, appropriate classroom behavior, enthusiasm for school, as well as the expected reading and math skills, they can overcome the potential limitations of low initial cognitive abilities.

Additional Findings

Although the primary focus of this study is on the mechanisms underlying the longitudinal relationship between child temperament characteristics and school achievement, some additional findings emerged that would be interesting to discuss.

Descriptive analyses revealed floor effects during Kindergarten for the Woodcock Johnson passage comprehension and math calculation tests. A discussion of the effects of standardized testing, especially when the test is clearly very difficult for the majority of the children tested, is

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beyond the scope of the present study. However, these findings alert us to the possible damaging effects of these tests on children's self esteem. Research in the area of educational testing needs to assess the effect of these tests on children's psychological well-being. Moreover, educators need to seriously consider using other measures, such as grades and classroom participation rates, to assess school achievement.

Path analyses revealed that virtually all measures assessed in this study were more stable from first grade to second grade than from Kindergarten to first grade. In addition, correlational analyses revealed that, overall, the relationships between social skills and academic competence on the one hand and school achievement on the other are stronger in second grade than they are in Kindergarten and first grade. Taken together, both of these results testify to the importance of the transition to school year. As Doris Entwisle and Leslie Hayduk (1988) strongly argued, there is a "window of opportunity" for interventions in the first year of school. During that first year, it is relatively easier to prevent the academic failure of students with characteristics that do not fit the demands of the school context before they are launched into unfavorable achievement trajectories that persist over the school years.

Correlational, regression, and LISREL analyses revealed that while initial ability is positively correlated with academic achievement test scores, it is negatively correlated with gain scores on academic achievement tests, especially at T2. One plausible explanation for this result is that students tend to "regress towards the mean" of their age group. When they enter school, children within the same classroom typically display a wide range of abilities and background information. As the children progress through the Kindergarten year, children who were academically disadvantaged at the beginning of school tend to catch up with the rest of the class. The opposite is usually true for students who begin school with very high abilities for their age.

Finally, Path analysis indicated that social skills are significantly correlated with school adjustment and academic competence at every grade level. This finding suggests that social skills are of great importance for school success. Being socially competent increases one's chances of being adjusted to school and of being academically competent which, in turn, facilitates academic achievement. Schools, therefore, need to pay special attention to the assessment and remediaton of social skill deficiencies in their students.

Implications of Study Findings

Temperament is clearly an important individual difference domain in school. A difficult temperament can cause problems in any child's school career. However, from a developmental contextual perspective, having a difficult temperament at the critical transition to school period, combined with all the challenges that poverty poses to a minority child and his family and school, can be even more detrimental to the child's development than would be typically expected.

Statistical surveys indicate that African American children, especially those from low income families, are more likely than other children to experience graderetention, to receive special education programs, and to drop out of school altogether (Entwisle & Alexander, 1988; Entwisle & Alexander, 1993). Minority children living in low income households and going through the transition to school period are thus especially deserving of special efforts to foster and develop in them the temperamental characteristics that are most desired within the school context.

This study showed that temperament has an effect on school achievement gains that lasts from Kindergarten untill second grade, at least. This effect of temperament on school achievement is routed through academic competence and social skills. Given the lasting effects of temperament on academic

competence, social skills, and, ultimately, school achievement, educators need to be alert to the importance of an early fit between student temperament and school environment. They need to be aware of the bi-directional relationships that take place between the individual and the context.

Educators need to recognize how the child's temperament affects teachers' and peers' behaviors and decisions and how these behaviors and decisions can then impact the child's development. As emphasized by Klein (1992), educators should be sensitive to the needs of children with difficult temperaments who might require additional support in order to realize their full academic potential. It is important that schools ensure that Kindergarten and first grade teachers in particular are aware of and know how to deal with children of different temperaments, since the effects are greatest in the transition to school period. In addition, the school environment as a whole needs to be made more flexible so that it can accommodate a wider range of child behavioral styles.

Educators should inform parents about the importance and value of certain behavioral styles in the school context. Educators can also work with parents on helping students learn and develop the behavioral styles that are

valued and expected by the schools. For example, parents may need help in developing a stable routine, a set of specific after school tasks, and a quiet study place for low attention-span children, since these children perform better under such conditions.

Schools could routinely assess all students' temperament upon entry into school. It is important, though, to avoid labeling children or viewing them in a negative light once their difficult temperament is identified. Rather, students with a difficult temperament as well, as the teachers of these students, should be given special assistance and extra support. The aim of identifying difficult children and making their teachers aware of them should be to help the students as well as the teachers learn and develop optimal interaction styles that will ensure the children's success within the school context.

Moreover, if differences in social skills are related to both school adjustment and academic competence, and, ultimately, to school achievement, educational curricula may need to shift from a predominantly academic program toward one that integrates academic, social, and other skills important for school competence and achievement. There is evidence that pro-social interpersonal skills can be learned (Fad & Ryser, 1993). Children with social skill deficits can

be instructed on specific social skills that can lead to an enhancement of their academic competence.

These assessments and interventions need to take place early on, as soon as, or even before, the child begins formal schooling and establishes a history of academic failure. It is undoubtedly preferable, from the psychological, social, economic, and practical points of view, to prevent the problems that would lead to school failure rather than remedy them later on.

Finally, a cautionary reminder is in order. This study should, by no means, be interpreted to implicate that the difficulties that African American children have in the school system are due to their "inappropriate" behavioral style compared to other students. In fact, the majority of the students (96 out of 175) in this sample had easy temperaments. Moreover, this study is not comparative and did not assess racial differences in temperament. Therefore, no conclusions regarding the temperamental characteristics of African American children compared to children from any other racial groups should be drawn from this study.

Limitations and Recommendations for Future Research

Because the data for this study describe the dynamics of the relationship between temperament and school achievement in a sample of low-income African American children at one mid-western school district in which the

students were predominantly African American and the teachers predominantly White, generalization from this study to other populations may be limited.

This is especially true because the school district we studied was undergoing very difficult and unusual circumstances during the period of data collection. For example, the district had a new superintendent who attempted broad and dramatic reforms that resulted in a great political fall-out. The school district became embroiled in tremendous controversy and in public and private debates throughout the 1992-1993 school year (Gassaway, Reischl, Ibrahim, Martin & Frassetto, 1997). Besides many other related activities, the community launched a successful recall effort against the school board members who supported the superintendent. Consequently, these school board members were removed from office and replaced with other elected members. Eventually the superintendent resigned. These events, no doubt, has a tremendous impact on personnel and the everyday operations of the entire school district.

The second major event for this district that occurred during the initial year of the present study was a severe financial crisis. This crisis led to numerous changes in administrative, teaching, and other support staff. Some principals, teachers and other staff were subsequently laid

off while others were reassigned to new schools and classroom.

These circumstances surrounding this specific school district at this particular point in time have provided a unique context within which the present study took place. From a contextual perspective, the results obtained in this study might be unique to the school district from which the data was collected, and, moreover, unique to the particular period of time during which data for the present study were gathered.

In addition, the present study is limited by its use of only one source of child academic competence ratings: teachers. While teachers appear to be a reliable source for such information, and while their perceptions are important (Brophy, 1983), their ratings may reflect their liking of the student or their beliefs about the student's achievement potential much more than they reflect actual child academic competence. A study that utilizes both teachers' and independent observers' ratings of academic competence and that includes data on the teachers' experience and training would be helpful to validate the findings of the present study regarding the relationships between temperament and academic competence and between academic competence and school achievement.

Along similar lines, it would be useful to obtain teachers' ratings of child temperament and of child school adjustment as well as the parents'. The lack of teacher data regarding temperament is an important limitation of the present study. The teachers' perceptions of the child temperament would be valid assessments of temperament within the relevant context to this study (the school). In addition, as discussed above, teachers would be very good sources of information on the child's adjustment to school, given their experience and exposure to many children from the same age group within the school context. In some cases, the teacher assessments of child temperament and school adjustment might be quite different than the parents', and that in itself would be very informative and enriching for research on child temperament and school adjustment.

This study is also limited by some of the instrumentation used. The scale used to measure temperament did not prove to be highly reliable in our sample. The internal consistency reliabilities for its five subscales ranged from .56 to .76 with an average alpha of only .63. In addition, the instrument used to assess school adjustment consisted of only six items. While its reliability for our sample was satisfactory, its validity as a measure of school adjustment would no doubt be enhanced by the use of more items tapping different aspects of school adjustment.

Perhaps then a significant relationship between school adjustment and academic achievement would emerge, especially if information on child school adjustment was obtained from teachers as well as parents.

Future research would also be advised to assess the demands of the particular school under study. The concept of "goodness-of-fit" between child temperamental characteristics and the school demands for temperament is the key to understanding why child temperament affects school achievement. The present study relied on previous research in designating a set of likely school demands regarding temperament. Because different school could possibly have different values, it would be informative to assess the demands of the educators and peers in the specific school or schools under investigation. If there turns out to be a definite, prescribed set of expectations for student temperamental characteristics in schools that is universal across teachers and schools (at least within the U.S.), it should be clearly identified and widely publicized for the benefit of educators as well as students.

In view of the importance of academic competence and social skills as factors influencing the impact of temperament on school achievement, these constructs warrant further attention. Perhaps the various dimensions of social skills and their relationship to academic competence should

be explored. Peer and self ratings of social skills could also be assessed. Identification of the social competencies valued by teachers and others within the school context is important because of their effect on academic competence and achievement test scores. Methods of enhancing the child's academic competence should also be studied, so that educators can be informed of the optimal strategies they need to use in training programs for helping children with difficult temperaments and social skill deficits adapt to the demands of the school context.

Quite possibly, some variables that were not part of the model proposed in the present study are important mediators of the relationship between temperament and school achievement. Peer popularity, self esteem, and parent-child interactions seem likely candidates. In addition, factors that act as buffers against problems associated with difficult temperament should be investigated. Parental support and nurturance, for example, might be important buffering factors. Future research that includes such variables in the analyses would be informative.

Finally, future research that would continue to longitudinally trace the dynamics of the relationship between temperament and school achievement beyond the second grade is needed. A longitudinal design is essential for understanding how temperament shapes academic development

over the years. A longitudinal design, such as the one used in the present study, also makes it possible to determine whether temperament contributes to academic achievement at a given grade level independent of other factors such as initial ability and prior achievement levels.

Conclusions

Many minority children, especially those living in poverty, are failing in the public school system. Many are dropping out of school without graduating. For minority students from families living under the poverty line, undergoing the transition to school with a difficult temperament can be especially detrimental to their academic prospects.

The parents of these children, no doubt, have more stressors and hassles in their everyday life than parents in middle and upper class households. Moreover, the school districts which these students attend certainly have less resources than those in more affluent neighborhoods. Teachers are likely working under many stressors themselves and are not likely to have the time and resources to provide each student with whatever is necessary to ensure their success.

While there is not much that schools can do about poverty and its associated vices, schools can definitely improve the academic prospects of their students by paying attention to the importance of child temperament in school achievement. Defining what teachers and schools value in terms of behavioral style and teaching those skills to children, as well as informing teachers of optimal ways to deal with difficult children should greatly enhance these students' chances for success. APPENDIX

Appendix

Instruments Used In The Present Study

- 1. Colorado Childhood Temperament Inventory
- 2. Academic Competence
- 3. Child's adjustment to school
- 4. Social Skills Rating System
- 5. Peabody Picture Vocabulary Test-Revised*
- 6. Woodcock-Johnson Test Battery-Revised: Tests of

Achievement*

^{*} Because of copyright laws, these questionnaires are not included in the Appendix

COLORADO CHILDHOOD TEMPERAMENT INVENTORY

Please indicate how well each of the following statements describes your child.

1	2	3	4	5
Not at all	Somewhat	Neutral	Somewhat	A lot
like	unlike		like	like
the child	the child		the child	the child

Sociability

1. Child makes friends easily 2. Child is very friendly with strangers 3. Child is very sociable 4. Child takes a long time to warm up to strangers 5. Child tends to be shy Emotionality 1. Child gets upset easily 2. Child tends to be somewhat emotional 3. Child reacts intensely when upset 4. Child cries easily 5. Child often fusses and cries Activity 1. Child is very energetic 2. Child is always on the go 3. Child prefers quiet, inactive games to more active ones 4. Child is off and running as soon as he wakes up in the 5. morning 6. When child moves about, he usually moves slowly Attention Span-Persistence 1. Child plays with a single toy for long periods of times 2. Child persists at a task until successful 3. Child goes from toy to toy quickly 4. Child gives up easily when difficulties are encountered 5. With a difficult toy, child gives up quite easily Soothability 1. Whenever child starts crying, she can be easily distracted 2. When upset by an unexpected situation, child quickly calms down 3. Child stops fussing whenever someone talks to him/her or picks him/her up 4. If talked to, child stops crying 5. Child tolerates frustration well

Academic Competence

The next nine items require your judgments of this student's academic or learning behaviors as observed in your classroom. Compare the student with other children who are in the same classroom. Rate all items using a scale of 1 to 5. Indicate the number that best represents your judgment. The number 1 indicates the lowest or least favorable performance, placing the student in the lowest 10% of the class. Number 5 indicates the highest or most favorable performance, placing the student in the highest 10% compared with other students in the classroom.

1	2	3	4	5	
Lowest	Next	Middle	Next	Highest	
10%	208	408	208	10%	

- 1. Compared with other children in my classroom, the overall academic performance of this child is:
- 2. In **reading**, how does this child compare with other children?
- 3. In **mathematics**, how does this child compare with other children?
- 4. In terms of grade level expectations, this child's skills in **reading** are:
- 5. In terms of grade level expectations, this child's skills in **mathematics** are:
- 6. This child's **overall motivation** to succeed academically is:
- 7. This child's **parental encouragement** to succeed academically is:
- 8. Compared with other children in my classroom, this child's **intellectual functioning** is:
- 9. Compared with other children in my classroom, this child's overall classroom behavior is:

Child's Adjustment to School

Please indicate how well each of the following statements describes your child.

0	1	2	3	4	5	6	7	8	9	10	
Not			а		SO	me		very		a	
much			littl	е				much		lot	

- 1. How much do you think your child likes school?
- 2. How much effort do you think your child puts into trying to do well in school?
- 3. How well do you think your child actually does in school?
- 4. How well does your child get along with his or her teacher?
- 5. How well does your child get along with other children at school?
- 6. How would you rate your child's overall adjustment to school at this time?

Social Skills Rating System

Social Skills Questionnaire-Teacher Form Elementary Level-Grades K-6 Gresham, F.M., & Elliott, S.N. (1990)

For the set of items below, please think about this student's present behavior. Decide **how often** the student does the behavior described. You may answer **0 for never**, **1** for sometimes, or **2 for very often**.

- 1. Controls temper in conflict situations with peers.
- 2. Introduces himself/herself to new people without being told.
- 3. Appropriately questions rules that may be unfair.
- 4. Compromises in conflict situations by changing own ideas to reach agreement.
- 5. Responds appropriately to peer pressure.
- 6. Says nice things about himself/herself when appropriate.
- 7. Invites others to join in activities.
- 8. Uses free time in an acceptable way.
- 9. Finishes class assignments within time limits.
- 10.Makes friends easily.
- 11. Responds appropriately to teasing by peers.
- 12.Controls temper in conflict situations with adults.
- 13.Receives criticism well.
- 14. Initiates conversation with peers.
- 15.Uses time appropriately while waiting for help.
- 16.Produces correct schoolwork.
- 17.Appropriately tells you when he or she thinks you have treated him or her unfairly.
- 18.Accepts peers' ideas for group activities.
- 19. Gives compliments to peers.
- 20.Follows your directions.
- 21. Puts work materials or school property away.
- 22.Cooperates with peers without prompting.
- 23.Volunteers to help peers with classroom tasks.
- 24. Joins ongoing activity or group without being told to.
- 25.Responds appropriately when pushed or hit by other kids.
- 26. Ignores peer distractions when doing class work.
- 27.Keeps desk clean and neat without being reminded.
- 28.Attends to your instructions.
- 29.Easily makes transition from one classroom activity to another.
- 30. Gets along with people who are different.

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